UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Southwest Region
501 West Ocean Boulevard, Suite 4200
Long Beach, California 90802-4213

August 30, 2010

In response, refer to:
2010/02234:JMP

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Lieutenant Colonel Torrey A. DiCiro
District Engineer
U.S. Department of the Army
San Francisco District, Corps of Engineers
1455 Market Street
San Francisco, California 94103-1398

Dear Colonel DiCiro:

Thank you for your May 26, 2010, request for consultation regarding the Monterey Peninsula Water Management District's (MPWMD) Carmel River Restoration and Maintenance Project, located in the Carmel River, Monterey County, California. The U.S. Army Corps of Engineers (Corps) proposes to permit the project with a Regional General Permit (RGP) pursuant to section 404 of the Clean Water Act (33 U.S.C. 1344). This letter transmits the NOAA's National Marine Fisheries Service's (NMFS) programmatic biological opinion and essential fish habitat (EFH) consultation for the Corps' permit.

The programmatic biological opinion addresses the effects of the proposed project on the threatened South-Central California Coast (S-CCC) steelhead (*Oncorhynchus mykiss*) Distinct Population Segment (DPS) and their designated critical habitat, pursuant to section 7 of the Endangered Species Act of 1973 (ESA), as amended (16 U.S.C. 1531 *et seq.*). NMFS concludes in the programmatic biological opinion that the proposed RGP will not jeopardize the continued existence of S-CCC steelhead, nor adversely modify or destroy their critical habitat. NMFS expects activities occurring under the RGP are likely to result in take of S-CCC steelhead, and, therefore, an incidental take statement is enclosed with this programmatic biological opinion. Project specific letters confirming compliance with the programmatic biological opinion will be issued for individual activities authorized under the RGP.

The EFH consultation addresses effects of the proposed RGP on EFH for various federally managed species within the Coastal Pelagic and Pacific Groundfish Fishery Management Plans. NMFS concludes in the EFH consultation that the proposed action would adversely affect EFH, however, the proposed action contains adequate measures to avoid, minimize, mitigate, or otherwise offset the adverse effects to EFH. Therefore, NMFS has no EFH Conservation Recommendations to provide.

Please contact Ms. Jacqueline Meyer of the North Central Coast Office at (707) 575-6057, or via electronic mail at Jacqueline.pearson-meyer@noaa.gov, if you have any questions about this consultation.

Sincerely,

Kevin Chu

for Rodney R. McInnis
Regional Administrator

Enclosure

cc: Chris Yates, NMFS, Long Beach
Bob Hoffman, NMFS, Long Beach
Bryant Chesney, NMFS, Long Beach
Kyle Dahl, USACE, San Francisco
Larry Hampson, MPWMD
Copy to file: 151422SWR01SR247

PROGRAMMATIC BIOLOGICAL OPINION

ACTION AGENCY: U.S. Army Corps of Engineers, San Francisco District

ACTION: Carmel River Restoration and Maintenance Regional General Permit

CONSULTATION CONDUCTED BY: NOAA'S National Marine Fisheries, Southwest Region, North Central Coast Office

FILE NUMBER: 151422SWR01SR247

DATE ISSUED: **August 30, 2010**

I. CONSULTATION HISTORY

On July 14, 2000, the U.S. Army Corps of Engineers (Corps) issued Public Notice No. 24460S for the proposed Carmel River Restoration and Maintenance Regional General Permit (RGP). On September 20, 2000, NOAA's National Marine Fisheries Service (NMFS) received a letter from the Corps initiating formal Endangered Species Act (ESA) section 7 consultation on the project. On October 17, 2000, the Monterey Peninsula Water Management District (MPWMD) requested that the Corps suspend permit processing until February 1, 2001, in order to resolve concerns raised during public comment on the Public Notice. On October 23, 2000, NMFS requested additional information in order to begin formal consultation. NMFS received the additional information on January 25, 2001. Formal consultation was "restarted" on February 1, 2001. During a series of meetings, U.S. Fish and Wildlife Service (USFWS), California Department of Fish and Game (CDFG), NMFS, and MPWMD agreed to changes to the project description for the RGP to further minimize adverse effects to listed species. The project description was finalized in May 2003. In November 2004, the Corps issued RGP 24460S which was valid until November 2009.

On February 19, 2010, the MPWMD submitted an application to the Corps to renew the RGP for another five years. By letter dated May 26, 2010, received by NMFS on June 1, 2010, the Corps initiated section 7 formal consultation for a renewed RGP. In addition, the Corps requested consultation for the project's potential effects to Essential Fish Habitat (EFH) pursuant to the Magnusons-Stevens Fishery Conservation and Management Act.

In many cases, projects included in this RGP are described under the Corps' Nationwide Permit program; however, because two species, South-Central California Coast (S-CCC) steelhead (*Oncorhynchus mykiss*) Distinct Population Segment (DPS) and California red-legged frog (*Rana aurora draytonii*), are listed as threatened[1] under the ESA, most activities to be covered

[1] Red-legged frog are under the jurisdiction of the U.S. Fish and Wildlife Service and are not considered further in this biological opinion.

by this RGP would require individual written authorization from the Corps. This RGP will allow activities to be carried out without obtaining individual Corps authorization.

This programmatic biological opinion is based on information provided in the project proposal, meetings and telephone conversations with MPWMD staff, field investigations, and other sources of information. A complete administrative record of this consultation is on file in the NMFS' North Central Coast Office, Santa Rosa, California.

II. DESCRIPTION OF THE PROPOSED ACTION

The Corps proposes to authorize an RGP pursuant to section 404 of the Clean Water Act for MPWMD to conduct river maintenance, restoration, and habitat enhancement activities and authorize similar privately-sponsored activities within a 18.6-mile segment of the Carmel River extending from the Carmel Lagoon at the Pacific Ocean up to, but not including, the San Clemente Dam at River Mile (RM) 18.6. The RGP would be effective for 5 years with work conducted between July 1 and October 31 of each year. The proposed project would restore bank stability and channel meanders in unstable areas and reestablish or enhance riparian resources in areas impacted by large storm events and/or low water conditions. This RGP does not authorize activities implemented during an emergency situation (*i.e.*, flood). Rather, section 7 consultation for emergency activities shall be completed using expedited emergency consultation procedures (50 CFR 402.05, USFWS and NMFS 1998). Activities authorized under this RGP are expected to benefit habitat conditions for S-CCC steelhead. NMFS is unaware of, and does not anticipate, any interdependent or interrelated actions associated with the proposed action.

The intent of the RGP is to streamline the permit process for project sponsors who are interested in the following types of projects:

Maintenance:
- installing erosion protection in unstable, degraded areas; and
- limited removal of vegetation and woody debris from the active channel.

Restoration and Fisheries Enhancement Activities:
- channel restoration in unstable areas;
- establishing or reestablishing riparian vegetation along stream banks and adjacent areas;
- maintenance or repairs of previously authorized restoration activities; and
- instream habitat enhancement such as creation of pool and riffle sequences, placement of large woody debris (LWD) and boulder groups, supplementing or adding cobble and spawning gravels.

Based on the current MPWMD staff level, limitations to the construction period normally imposed by various agencies (*e.g.*, CDFG, USFWS, NMFS) and other constraints to work in the river (*e.g.*, high flows, spawning, smolt and adult migration), the number and size of each project will be limited. The maximum scope of work proposed under this RGP would be for a maximum of .7 miles (3,600 linear feet [ft]) of stream channel annually. MPWMD-sponsored restoration and maintenance projects would total one-half mile (.5 mile, approximately 2,600 linear ft) of stream channel, and privately-sponsored projects would be limited to a total of 1,000 linear ft (.2 mile) of stream channel annually. Selective hand clearing of vegetation and woody debris management would be limited to a maximum of three miles of stream length per year.

A. Proposed Activities Covered by the RGP

1. Installing Erosion Protection

Natural events and human activities have led to accelerated erosion, channel degradation, and loss of riparian habitat along a large segment of the Carmel River. Under this RGP, MPWMD would implement or authorize installation of erosion protection in areas degraded by scour and lack of vegetation to aid recovery of the riparian ecosystem.

a. Excavation and Backfill

Grading of the river banks may be required to recontour or reduce the slope of the existing bank to 2:1 or flatter. In cases where the river bank is being severely undercut or eroded, the toe of the bank may be stabilized by excavation of a toe trench, up to several feet deep below the adjacent channel bottom, and backfilling the trench with rock slope protection (rip-rap) and/or incorporating a biotechnical method to prevent scour. Material excavated from such trenches would normally be placed on the stream banks.

Temporary fill for access may be required to allow equipment into the work area. Additionally, excavation and fill may be necessary for a temporary flow diversion structure. Excavation activities could include the use of a backhoe to dig planting holes for trees and to trench irrigation lines. Prior to the start of channel grading work, salvageable vegetation along the project reach may be removed with mechanized equipment and relocated within the project. In areas where the banks have been severely eroded, excess channel or gravel bar material may be excavated, stockpiled, and used as backfill material. Only material above the level of frequent flows (*i.e.*, the 1.5- to 3.0-year return flow) will be excavated for backfill. Fill material required for bank stabilization projects may include rock slope protection, vegetative material, and other material such as boulders and logs. Fill material could also include topsoil that would be placed over rip-rap and along regraded banks.

b. Importation of Fill Material

Areas with property loss could be backfilled to a pre-loss configuration. Imported soil shall be free of deleterious material and be coarse grained (*i.e.*, have some gravel in it), sandy loam, loamy sand, or sand. Fill material will match, as nearly as possible, the grain size distribution found within the project area. As with excavation and backfill activities, stream bank areas could be stabilized with structural and/or biotechnical erosion protection in key areas.

c. Slope Protection

Slope protection may be installed along unstable, degraded areas of banks that have eroded and are causing sediment input into the river or are threatening structures along the riverbank. It should be noted that all bank stabilization projects conducted under this permit will incorporate bioengineering techniques as the first choice of construction methods.

Where bank erosion occurs within 25 ft of public or private infrastructure (including, but not limited to, roads, buildings, bridges, and utilities), rip-rap, or other traditional slope protection will be used. Where structures are not within 25 ft of an erosion site, no more than eight vertical ft of rip-rap will be used above the channel bottom.

The majority of these sites are located on the outside of meander bends or in areas where bank vegetation has eroded away. Slopes protected by structural erosion protection will be built at a 2:1 (horizontal to vertical) grade or flatter. Slope areas adjacent to structures may also be graded at a 1:5:1 slope, if a 2:1 slope is not possible (*e.g.,* due to floodplain regulations that restrict the amount of fill that can be placed within the 100-year floodway).

Other slope areas will be constructed at a 2:1 (horizontal to vertical) grade or flatter. Erosion protection installed on these slopes could be geotextiles, live plant material, logs, rootwads, or other flexible types of erosion protection. At the outside of bends and in critical erosion areas, a combination of erosion-resistant materials, log deflectors, rip-rap, and vegetation will be installed to provide bank protection in case of high flows. Erosion protection installed along the outside of meander bends may consist of granite rip-rap in the 1/4- to 3-ton class, if it is infeasible to install bioengineered structures. This structural protection will eventually blend into vegetation planted on the bank and along the toe of the riverbank. Filter fabrics that act as a barrier to root development will not be allowed. Other filtering materials such as biodegradable filters, gravel filters, or "backing rock" would be used. An exception would be for slope protection of public or private infrastructure that is within 25 ft of the active channel.[2] In this case, the graded slopes may be steeper, such as a 1.5:1.

d. Temporary Diversion Channel

Where necessary to divert flow around a work site in areas of perennial flow, a temporary diversion channel will be excavated, usually in a dry portion of the channel bottom, to pass flow around the site. An excavated diversion channel (open channel) will be used rather than piping to allow flexibility with changing stream flows, avoid increased water temperatures within a pipe, and to allow fish to move through the project area over natural substrates. Material excavated from the diversion channel (primarily sand, gravel, and cobble) will be used to temporarily block the bottom of the stream channel and divert flow into the diversion channel for

[2] Note: The active channel refers to the lowest portion of the main stem channel that is occupied by flows of between the 1.5-year and 3.0-year return frequency. Generally, for the Carmel River, this is the area within the bottom of the channel that is inundated by four to eight ft (vertically) of flow. This corresponds roughly with the Corps' wetlands jurisdictional limit.

the duration of the project. After construction is completed, the diversion berm will be removed, and the excavated trench area filled in to pre-existing contours.

e. Fish capture and Relocation

Prior to diverting flow around a work site, fish will be captured and removed from the site. Porous fish fences and/or rock/gravel barriers will be set up to exclude fish from the repair site. Fish fences (plastic mesh) are less desirable than rock barriers, as they require daily cleaning due to algae and other organic build-up and are subject to failure if flow fluctuates. Once the porous rock barriers are set up at the head and tail of the repair site, flow shall be gradually reduced through the site to maintain viable habitat conditions and improve efficiency of capture gear, which can include 1/4 inch stretch mesh beach seines and electrofishing gear. If flow in the river is perennial or nearly so throughout the river, fish located in repair sites can be captured with a variety of techniques designed to minimize capture stress, and direct or delayed mortality from physical injury. Electrofishing techniques will follow guidelines established by NMFS (*NMFS Guidelines for Electrofishing Waters Containing Salmonids Listed under the Endangered Species Act, June 2000*). The minimum amount of current and voltage will be used to ensure capture of the fish during three repetitive passes through the repair site over a one-day period. In no case will output voltage exceed 300 volts.

Captured fish will be placed in an insulated, oxygenated tank filled with Carmel River water, and transported to areas of perennial flow or to the MPWMD Sleepy Hollow facility. Water temperature in the tank will be controlled by using ice if necessary. Generally, fish will not be placed downstream of a repair site, as habitat conditions usually decrease in the downstream direction due to reduced flow and increased water temperature. Fish could be placed downstream of a repair site, however, if conditions allow. The data on cumulative catch and catch per unit effort will be used to estimate total population size in the repair site.

2. Vegetation and Woody Debris Management

Since Fall 1990, MPWMD has carried out annual channel clearing projects along portions of the Carmel River to reduce the potential for bank erosion and to maintain channel capacity. Vegetation growth and sediment deposits trapped by vegetation decrease hydraulic capacity of the river channel and may cause debris jams that increase the potential for bank erosion and damage to public infrastructure. In addition to erosion hazard reduction for property, channel clearing objectives include removing trash and inorganic debris from the river channel and maintaining aquatic habitat.

MPWMD proposes to modify or remove vegetation and wood from the channel bottom under a limited set of circumstances and with full recognition of and mitigation for impacts associated with such activity. These activities would follow MPWMD's "*Final Guidelines for Vegetation Management and Removal of Deleterious Materials for the Carmel River Riparian Corridor*" (MPWMD 2003). Streamside plants growing on adjacent riverbanks would not be affected. Vegetation cutting normally will be done by hand crews using hand tools and hand-held power tools. Some cut vegetation will be chipped on the terraces above the riverbank or utilized in MPWMD bank stabilization projects elsewhere along the river. Large wood (defined here as four inches or greater in diameter or three ft or longer in length) may be modified under certain circumstances. Only LWD that poses a hazard to public facilities [*e.g.*, bridges] will be notched and left in place to break apart if mobilized. Otherwise, all LWD will be left undisturbed in the channel.

3. Channel Restoration

Channel restoration may be used to realign the river channel if, during high flows, the river scours a new meander bend or channel through the floodplain, resulting in unstable, vertical banks. Projects normally will include excavation and backfill to realign the channel and slope the vertical bank, excavation of a meandering, low-flow channel with a pool and riffle sequence within the realigned channel, and replacement of cobble and gravel material along the channel bottom.

a. Excavation and Backfill

Excavation and fill activities will be required to implement channel restoration projects. Excavation of sand and gravel bars may be carried out to realign the active channel into a more stable configuration. This is a key component of reestablishing meander geometry and recreating low-lying floodplain areas outside of the active channel. A low-flow channel capable of carrying dominant or frequent flows (*i.e.*, 1.5- to 3.0-year events) will be excavated within the channel bottom. This low-flow channel meanders back and forth and generally has a wavelength between 1,000 and 2,000 linear ft. The amplitude of meanders is frequently dictated by existing constraints; however, where possible, an increase in amplitude (*i.e.*, sinuosity) would be desirable. For large restoration projects, this activity is frequently combined with installation of erosion protection at critical areas, such as at the outside of meander bends.

Projects normally include excavation of a narrow, stable channel, excavation of a pool and riffle sequence after reestablishment of a stream channel, excavation of gravel bar material, and replacement of cobble and gravel material along the channel bottom. During excavation, substrate material is stockpiled at the beginning of grading and replaced during final grading operations.

In most cases, large equipment such as a front end loader, dump truck, backhoe, bulldozer, or excavator will be used to restore channel geometry to a more stable alignment. Temporary fill for access may be required to allow equipment into the work area. Excavation and fill may be necessary for a temporary flow diversion structure. Prior to the start of channel grading work, salvageable vegetation within the project reach will be removed with mechanized equipment and relocated to bank stabilization project areas.

b. Channel Realignment

Project work starts by surveying and staking project boundaries to prevent heavy equipment operation outside the work area. The contractor begins grading by scraping off the "upper" layer of the riverbed, which contains the largest proportion of cobbles and gravel. Deleterious material, such as auto parts, various metal objects, and refuse, will be hauled away to an appropriate dump site outside Corps jurisdiction. A channel of appropriate dimensions will be regraded in the stream. The finished channel will be designed to carry excess sediment stored in point bars located within and upstream of the project. Material excavated from the channel can be used to buttress eroded slopes and to build an active floodplain for vegetation plantings. In some cases, rip-rap may be keyed into the toe to stabilize eroded slopes. After completion of this work, a smaller low-flow (pilot) channel is excavated within the main channel. This low-flow channel provides fish passage for migrating steelhead during periods of low flow. Pools are excavated at appropriate intervals (usually five to seven channel widths) to provide areas for migrating steelhead to rest and feed and to provide habitat for California red-legged frogs. In most areas the finished stream bottom will be at or near the elevation of the existing channel bottom.

If existing streamside ponds or pools are filled in during channel and floodplain construction, this action would be offset by the creation of new pools and/or low-lying floodplain areas adjacent to the new active (*i.e.*, bankfull) channel.

4. Re-establishing Riparian Vegetation

Banks and low floodplain terraces will be revegetated with willow, cottonwood, sycamore, box elder, elderberry, and other native riparian species. Special emphasis will be placed on revegetation with plant species that are appropriate for the restored bank or terrace elevation and moisture condition. The integration of top soil into the slope assists in the retention of moisture and provides a more nutrient-rich medium for root development. In several of MPWMD's restoration areas, the willows are sufficiently large that cuttings for other projects can be taken.

All graded slopes, including rip-rapped areas, will be revegetated with cuttings or seedlings on a four- to seven-ft grid. As a component of re-establishing native riparian cover, an irrigation system will be installed (if needed), operated, and maintained for a minimum of three years. If feasible, appropriate low-lying areas may be irrigated to provide refugia for wildlife. Weed removal would continue for a minimum of three years. MPWMD standards for the Carmel River include replanting of native riparian vegetation in areas that do not achieve a 70 percent success rate by year three after initial planting.

Revegetation and irrigation will also occur in areas impacted by water extraction. These efforts will occur throughout the riparian corridor along stream banks, in floodplain areas, and occasionally in terrace areas. Plantings will include many of the woody riparian species found in the Carmel River drainage and several understory species.

5. Maintenance of Previously Authorized Restoration Sites

One of the goals of MPWMD's river projects is to carry out works that will eventually need no maintenance. However, floodplain development, two existing mainstem dams, and water extraction practices disrupt restorative processes that would normally occur in the riparian zone after episodes of erosion. Restoration projects may require maintenance work either to repair flood damage or to stabilize a project after initial construction.

Maintenance work normally includes irrigation operation and repair, weed removal, and installation of supplemental plantings. For MPWMD-sponsored projects, MPWMD normally enters into a 10-year agreement with landowners to perform this type of activity. For privately-sponsored projects, MPWMD requires maintenance for a three-year period, which is a generally accepted period for plant establishment.

Restoration projects using techniques that rely on streamside vegetation for erosion protection are vulnerable to damage from high flows in the first few years after plant installation. For this reason, repairs may be required to stabilize damaged areas. A combination of methods and techniques previously discussed would normally be used in repair work.

6. Fisheries Habitat Enhancement

Improvement of degraded anadromous fisheries resources in the lower Carmel River watershed has long been considered a primary goal of MPWMD's river restoration program. Several activities are proposed by MPWMD to enhance or restore steelhead habitat. Fish habitat enhancement projects include excavation of a pool and riffle sequence after reestablishment of a stream channel, placement of log and boulder groups at erosion protection locations to provide additional habitat, replacement of gravel material along the channel bottom, floodplain restoration, riffle passage modifications, and revegetation of riparian habitat along the banks of the river. These actions will reduce the potential for bank erosion that degrades aquatic habitat and will increase the availability and quantity of rearing and spawning habitat.

Live plant material, logs, and rootwads will be incorporated with slope protection, including boulders, to provide shelter and cover for juveniles as well as substrate for macroinvertebrates. LWD may also be installed at discrete locations without bank slope protection to enhance steelhead habitat. In addition, installation of LWD structures could be used in places where the river channel has degraded (incised into the floodplain) in order to help slow the degradation.

Riffles resulting in passage barriers (*i.e.*, critical riffles) may be modified using hand tools, a portable crane, handwinch, and/or small portable dredge. Modification would include excavating a small channel through the critical riffle to concentrate flows and improve steelhead passage over the riffle.

Spawning gravels may be placed at various locations between Carmel Valley Village and the upstream limit of the RGP. These gravels will be delivered to the channel by dump trucks unloading gravel along the stream bank and allowing high flows to distribute the gravels downstream. This is intended to result in the re-establishment of substrate suitable for spawning and macroinvertebrates. Spawning gravels shall be free of contaminants, river-run (no crushed or sharp-edged gravel), and of suitable size for salmonid spawning habitat.

B. Avoidance/Minimization Measures for Adverse Impacts to S-CCC Steelhead DPS

In order to minimize and avoid impacts to steelhead, projects approved by MPWMD will adhere to the following conservation measures:

1. Harassment to S-CCC Steelhead DPS from In-Water Construction or Activities

- Construction will occur only in the dry stream channel by being separated from flowing water, or if the channel is dry seasonally by being conducted during the dry period.
- Listed steelhead in the project area during construction activities will be removed and relocated prior to the onset of activities.

2. Dewatering or Water Diversions

- No redds will be dewatered when eggs or alevins are present.
- The stream channel will be returned to its original state at the completion of dewatering and construction.
- The duration of dewatering will be minimal.
- The dewatering method will minimize harassment, risk of mortality, risk of entrapment, and risk of stranding of steelhead.
- Projects that require dewatering of the stream channel will first avoid dewatering the entire channel in order to maintain passage for steelhead by methods such as the following examples: use of a washed, clean gravel berm slowly placed to displace steelhead without crushing any; inflatable bladders from behind which fish are chased away.
- Projects requiring entire stream dewatering will incorporate the installation of a coffer dam and temporary bypass channel, or other methods which minimize impacts to steelhead.
- Channel and bank disturbances will be first avoided, then minimized, during placement of the dewatering "structure."
- Any wastewater from project activities and dewatering will be disposed of off-site or in a location that will not drain directly into a stream channel or carry sediment-laden water into a stream channel.
- After construction, when water is returned to the construction area, the habitat will be accessible to steelhead.

3. Fish Capture and Relocation

- For projects involving dewatering and/or relocation, project proponents will use NMFS-approved fisheries biologists familiar with identification and handling of all life stages of listed steelhead to monitor the specific project area.
- Prior to and during stream flow diversion and dewatering, the biologist will capture any steelhead that may become stranded in the residual wetted areas as a result of project activities and relocate the individuals to the nearest suitable instream location immediately up- or downstream of the work area.
- All fish will be moved promptly and transported in insulated containers filled with cool, well-oxygenated water. Fish will be captured, held, and transported according to MPWMD's "*Recommended Number of Juvenile Steelhead in 5-, 125-, and 400-*

Gallon Containers, at Loading Densities Ranging form 0.02 to 0.1 Kg/Kg Guidelines".

- The fishery biologist will note the number of individuals observed in the affected area, the number of individuals relocated, and the date and time of the collection and relocation.
- All efforts will be taken to neither exhaust nor kill listed steelhead during collection and relocation.
- The fishery biologist will be empowered to halt work activity for steelhead collection.

4. Construction Access and Temporary Stream Crossings

- Construction impacts are confined to the absolute minimum area necessary to complete the project, and the site will be rehabilitated prior to October 31 each year.
- Damaged areas will be restored to pre-work conditions. Where the site will be revegetated or restored, top soil will be stockpiled for redistribution on the project area.
- Temporary crossings will pass all listed steelhead in the stream concurrent with the crossing.
- Temporary crossings will be removed prior to October 31 each year.
- Flatcar bridges with pre-constructed footings will be used if they create fewer impacts than temporary culverts.

5. Impediment to Upstream or Downstream Migration by Listed Steelhead during Water Diversion/Bypass Construction Activities

- Temporary migration impediments will occur only during non-migratory periods.
- The amount of time a temporary migration impediment is in place will be restricted to the minimum necessary to complete the project.
- If a bypass pipe is installed, depending on the site and potential impacts to listed steelhead from being in the bypass pipe, the pipe will be screened in accordance with NMFS screening criteria (NMFS 1996, NMFS 1997) to prevent fish from entering. Alternatively, pipe that facilitates migration will be used, for example, a pipe containing baffles and that is kept out of direct sunlight to prevent warming.

6. Degradation of Water Quality and Channel Structure from Turbidity or Sediment Plumes and Toxics and/or Petroleum Products from Machinery

- Construction will be avoided when eggs or alevin are in the gravels downstream.
- Excavation in stream banks will be isolated so that water is prevented from entering the excavated area until the project materials are installed and erosion protection is in place.
- Effective erosion control measures will be in place at all times during construction. Construction within the 5-year floodplain will begin with placement of all temporary erosion controls (*e.g.*, straw bales, and silt fences that are effectively keyed in) downslope of project activities within the riparian area. Erosion control structures will be maintained throughout and, if needed, after construction activities.

- Sediment will be removed from sediment controls once it has reached one-third of the exposed height of the control. Whenever straw bales are used, they will be staked and dug into the ground 12 centimeters (cm). Catch basins will be maintained so that no more than 15 cm of sediment depth accumulates within traps or sumps.
- Sediment-laden water created by construction activity will be filtered before it enters the stream network or an aquatic resource area.
- A supply of erosion control materials (*e.g.*, straw bales and clean straw mulch) will be kept on hand to respond to unanticipated storm events or emergencies.
- The use of end hauling will be maximized to reduce the temporary stockpiling of earth to be removed from the project site.
- Temporary stockpiling of earth during wet weather will be avoided.
- Concurrent with projects occurring during wet weather, erosion control (protection or stabilization) will be used on stockpiles (all of which will be temporary and unavoidable) and exposed soils. Soils will not be left exposed overnight; exposed soils will receive final erosion protection as soon as that area will not receive further disturbance, and all areas will be stabilized within seven days of project completion or prior to forecasted rain, whichever is sooner. Movement of soil off of stock piles will be prevented by, for example, covering any temporary stockpiles with plastic sheeting or tarps; and/or installing a berm around the stockpile; and/or preventing the overland flow of water from upslope road or hillside from contacting stockpile; and preventing any water-carrying material from a stockpile from entering the aquatic ecosystem.
- Material removed during excavation will be placed only in locations where it cannot enter stream networks. Conservation of topsoil (removal, storage and reuse) will be employed.
- Sediment wedges that may be released by a proposed project will be removed to an upland location, placed in a location where they cannot enter stream networks or road drainages that are hydrologically connected to a stream and stabilized.
- After project completion and prior to October 31, all exposed soil will be stabilized, for example using erosion control seeding and mulching. Placement of erosion control blankets and mats (if applicable) will occur within seven days.
- Efforts will be made to cover exposed areas as soon as possible after exposure.
- Temporary fill will be removed in its entirety prior to October 31 of the year of activities.
- Areas for fuel storage and refueling and servicing of construction equipment and vehicles will be located in an upland location.
- All equipment that is used for in-water work will be cleaned to remove external oil, grease, dirt, and mud prior to placing the equipment in the water; wash sites will be placed so that wash water does not flow into flowing waters or wetlands; equipment will be in good condition showing no signs of leaking fuels or fluids.
- Petroleum products, chemicals, fresh cement, or deleterious materials will not be allowed to enter flowing waters.
- Water contaminated by petroleum products, chemicals, fresh cement, or deleterious materials will not be allowed to enter flowing waters.
- In the event of a spill, the permittee will stop work immediately, begin clean up, and notify the appropriate authorities.

- Spill clean-up supplies (*e.g.*, absorbent booms when working in live streams) will be on site, and operators will know how to employ them.

7. Loss of Large Woody Debris (LWD) and In-Channel Vegetation from Vegetation Management Activities

- The amount of in-channel vegetation removal will be minimized to only what is necessary, as determined by MPWMD, to reduce erosion and potential bank failure.
- Only in-channel vegetation larger than three inches in diameter will be removed.
- Vegetation trimming and clearing will be done with the use of hand tools and hand-held power tools.
- Only LWD that poses a hazard to public facilities (*e.g.*, bridges) will be notched and left in the channel to break apart if mobilized; otherwise, all LWD will be left undisturbed in the channel. When notching LWD, the core 30 percent of the diameter of the tree or six inches, whichever is greater, will remain unnotched.
- Heavy equipment used to remove saplings and rootwads for salvage and replanting will operate only in the dry channel bed.
- Compaction will be minimized by using equipment that either has (relative to other equipment available) less pressure per square inch on the ground or a greater reach, thus resulting in less compaction or less area overall compacted or disturbed.

8. Loss of Riparian Vegetation

- All native trees and brush will be retained as feasible, emphasizing the shade-producing and bank-stabilizing trees and brush.
- Project designs and access points will be used that minimize riparian disturbance without affecting less stable areas that may increase the risk of channel instability.
- Disturbed areas will be revegetated with native plant species. Coring for revegetation will help to decompact soils. The species used will be specific to the project vicinity and comprise a diverse community structure (plantings should include both woody and herbaceous species).
- A ratio of three plantings to one removed plant (3:1 ratio) will be used.
- Unless otherwise specified, the standard for success will be 70 percent survival of plantings after a period of three years.
- Broadcast planting of seed will result in 70 percent ground cover after a period of three years.
- Mitigation and restoration sites will be monitored yearly in spring or fall months for three years. If there is not 70 percent survival after three years, all plants that have died will be replaced during the next planting cycle (generally the fall or early spring) and monitored for a period of three years after planting.
- If chemical fertilizers are applied, fertilizer will not enter the hydrologic network and will not be carried by runoff into the hydrologic network.

- Herbicides will not be applied in the project area, except at MPWMD irrigation sites to control poison oak and non-native invasive species. Only the use of *Rodeo*© or a technical grade of glyphosphate (without surfactant) will be allowed.

9. Bank Stabilization and Associated Habitat Loss and Long-term Channel Changes

- The first choice of bank stabilization techniques will be "soft" bioengineering methods.
- Rock slope protection (rip-rap) will be used only as a last choice when bioengineering methods cannot provide adequate protection to infrastructures.
- Very large angular rock will be used to reduce chance of movement.
- LWD will be incorporated into the rip-rap.
- Willow cuttings will be staked through the rip-rap into the bank beneath.
- Rip-rap will be terraced and trees will be planted on the terraces.
- Soil will be imbedded into the interstitial spaces above ordinary high water mark (OHWM) and planted with riparian vegetation.
- Where feasible, rip-rap will be designed with "hard points." Instead of a solid linear wall of rip-rap along a length of stream bank, rock groins will be placed strategically in noncontiguous sections.
- An underlay of gravel, biodegradable filter fabric, or matting will be used when appropriate for rip-rap.

C. Administration of the RGP

The RGP will be implemented in a manner consistent with the process described below:

- For MPWMD-sponsored projects, MPWMD will be responsible for planning, design, environmental review, securing permits, construction management, restoration planting, irrigation system installation, monitoring, and project maintenance.

- In addition to MPWMD-sponsored restoration projects, MPWMD will also act as an agent for other publicly- and privately-sponsored projects that qualify for authorization under the RGP. MPWMD will assume the responsibility for screening applicants, conducting pre-project evaluations, and inspecting project sites after completion to ensure compliance with criteria outlined in the RGP. MPWMD will review proposed designs for conformance with existing standards. MPWMD will issue to each party proposing to do work a River Work Permit that requires compliance with Corps 404 permit conditions and MPWMD standards.

- Applicants seeking project permit authorization will provide to MPWMD a notification package containing information, maps, and plans, including but not limited to: a project description with date and duration of construction, an erosion control plan, a temporary streamflow diversion plan, description of impact minimization practices used during construction activities, a mitigation and monitoring plan, and the identification of listed species and life stages that may use the project area at any time.

- MPWMD will review the notification package for completeness, determine if the RGP is applicable to the proposed project, and send the notification package to the Corps.

- The Corps will forward the notification package to NMFS with a cover letter requesting NMFS' concurrence that the proposed project complies with this programmatic biological opinion. If NMFS concurs, the action will be appended to the programmatic consultation.

- After receipt of concurrence from NMFS, the Corps will authorize implementation of the project. The Corps will notify NMFS prior to authorization.

- MPWMD will be responsible for the preparation of annual post-notification/compliance reports to be provided to NMFS. These reports will contain:

  - information on all projects constructed under the RGP for a given year;

  - MPWMD evaluation forms prepared for each project; and

  - project specific information such as: a) project descriptions, b) project impacts, c) maps, d) pre- and post-construction photographs, e) quantities and types of fill material, f) salmonid life stages that may use the project area at any time, and g) compliance with all permit conditions.

D. Action Area

The action area is defined as all areas affected directly or indirectly by the Federal action and not merely the immediate area involved in the action (50 CFR 402.02). For the RGP, the action area is defined as the lower 18.6 miles of the Carmel River downstream from the San Clemente Dam including the river channel and banks in Monterey County, California.

III. ANALYTICAL FRAMEWORK

A. Jeopardy Analysis

In accordance with policy and regulation, the jeopardy analysis in this biological opinion relies on four components: (1) the Status of the Species, which evaluates the S-CCC steelhead DPS's range-wide conditions, the factors responsible for that condition, and the species' likelihood of both survival and recovery; (2) the Environmental Baseline, which evaluates the condition of this listed species in the action area, the factors responsible for that condition, and the relationship of the action area to the likelihood of both survival and recovery of this listed species; (3) the Effects of the Action, which determines the direct and indirect effects of the proposed Federal action and the effects of any interrelated or interdependent activities on this species in the action area; and (4) Cumulative Effects, which evaluates the effects of future, non-Federal activities in the action area on this species.

The jeopardy determination is made by adding the effects of the proposed Federal action and any Cumulative Effects to the Environmental Baseline and then determining if the resulting changes in species status in the action area are likely to cause an appreciable reduction in the likelihood of both the survival and recovery of this listed species in the wild.

The jeopardy analysis in this biological opinion places an emphasis on the range-wide likelihood of both survival and recovery of this listed species and the role of the action area in the survival and recovery of this listed species. The significance of the effects of the proposed Federal action is considered in this context, taken together with cumulative effects, for purposes of making the jeopardy determination. We use a hierarchical approach that focuses first on whether or not the effects on salmonids in the action area will impact their respective population. If the population will be impacted, we assess whether this impact is likely to affect the ability of the population to support the survival and recovery of the S-CCC steelhead DPS.

B. Adverse Modification Determination

This Biological Opinion does not rely on the regulatory definition of destruction or adverse modification of critical habitat at 50 CPR 402.02.[3] Instead, we have relied upon the statutory provisions of the ESA to complete the following analysis with respect to critical habitat.

In accordance with policy and regulation the adverse modification analysis in this Biological Opinion relies on four components: (1) the Status of Critical Habitat, which evaluates the range-wide condition of critical habitat for the S-CCC steelhead DPS in terms of primary constituent elements (PCEs), the factors responsible for that condition, and the intended conservation value of the critical habitat overall; (2) the Environmental Baseline, which evaluates the condition of critical habitat in the action area, the factors responsible for that condition, and the conservation value of the critical habitat in the action area; (3) the Effects of the Action, which determines the direct and indirect impacts of the proposed Federal action and the effects of any interrelated or interdependent activities on the PCEs in the action area and how that will influence the conservation value of affected critical habitat units; and (4) Cumulative Effects, which evaluates the effects of future, non-Federal activities in the action area on the PCEs and how that will influence the conservation value of affected critical habitat units.

For purposes of the adverse modification determination, we add the effects of the proposed Federal action on S-CCC steelhead critical habitat in the action area, and any Cumulative Effects, to the Environmental Baseline and then determine if the resulting changes to the conservation value of critical habitat in the action area are likely to cause an appreciable reduction in the conservation value of critical habitat range-wide. Similar to the hierarchical approach used above, if the proposed action will negatively affect PCEs of critical habitat in the action area we then assess whether the conservation value of the stream reach or river, larger

[3] This regulatory definition has been invalidated by Federal Courts.

watershed areas, and whole watersheds will be reduced. If these larger geographic areas are likely to have their critical habitat value reduced, we then assess whether or not this reduction will impact the value of the DPS's critical habitat designation as a whole.

C. Use of Best Available Scientific and Commercial Information

To conduct the assessment, NMFS examined an extensive amount of information from a variety of sources. Detailed background information on the biology and status of the listed species and critical habitat has been published in a number of documents including peer reviewed scientific journals, primary reference materials, and governmental and non-governmental reports. Additional information regarding the effects of the project's actions on the listed species in question, their anticipated response to these actions, and the environmental consequences of the actions as a whole was formulated from the aforementioned resources, the biological assessment for this project, and project meeting notes if applicable. For information that has been taken directly from published, citable documents, those citations have been referenced in the text and listed at the end of this document.

IV. STATUS OF THE SPECIES AND CRITICAL HABITAT

This biological opinion analyzes the effects of the Monterey Peninsula Water Management District's (MPWMD) Carmel River Restoration and Maintenance Regional General Permit (RGP) on the following Pacific salmonids and critical habitat:

- **S-CCC steelhead (*Oncorhynchus mykiss*) DPS**
  Threatened (January 5, 2006; 71 FR 834)
  Critical habitat (September 2, 2005; 70 FR 52488).

In this opinion, NMFS assesses four population viability parameters to help us understand the status of S-CCC steelhead DPS and the population's ability to survive and recover. These population viability parameters are: abundance, population growth rate, spatial structure, and diversity (McElhany *et al.* 2000). While there is insufficient information to evaluate these population viability parameters in a thorough quantitative sense, NMFS has used existing information to determine the general condition of the S-CCC steelhead DPS and factors responsible for the current status of S-CCC steelhead DPS.

We use these population viability parameters as surrogates for numbers, reproduction, and distribution, the criteria found within the regulatory definition of jeopardy (50 CFR 402.20). For example, the first three parameters are used as surrogates for numbers, reproduction, and distribution. We relate the fourth parameter, diversity, to all three regulatory criteria. Numbers, reproduction, and distribution are all affected when genetic or life history variability is lost or constrained resulting in reduced population resilience to environmental variation at local or landscape-level scales.

A. Species Life History and Population Dynamics

Steelhead possess a complex life history requiring successful completion and transition through various life stages in marine and freshwater environments (*e.g.*, spawning and outmigration, egg-to-fry emergence, juvenile rearing, smolt outmigration and ocean survival). Eggs (laid in gravel nests called redds), alevins (gravel dwelling hatchlings), fry (juveniles newly emerged from stream gravels), and young juveniles all rear in freshwater until they become large enough to migrate to the ocean to finish rearing and maturing to adults. Eggs incubate and emerge in about three weeks (depending on water temperature), and the alevins remain in small spaces between gravels before entering the stream water column. Cover is an important habitat component for juvenile steelhead, both as a velocity refuge and as a means of avoiding predation (Meehan and Bjornn 1991, Shirvell 1990). Steelhead, however, tend to use riffles and other habitats not typically associated with instream cover during summer rearing more than other salmonids. Young steelhead feed on a wide variety of aquatic and terrestrial insects, and emerging fry are sometimes preyed upon by older juveniles. Rearing steelhead juveniles prefer water temperatures of 45-58 degrees Fahrenheit (°F) and have an upper lethal limit of 75 °F (Bjornn and Reiser 1991, Barnhart 1986). They can survive in water up to 80.6 °F with saturated dissolved oxygen conditions and a plentiful food supply. Fluctuating diurnal water temperatures also aid in survivability of salmonids (Busby *et al.* 1996).

Juveniles usually spend one to three years in freshwater, then smolt and migrate to the ocean, using an estuary for acclimation to saltwater and as a migration corridor. They usually spend one to four years in the ocean, where they mature into adults before returning to their natal stream to spawn. Steelhead may spawn one to four times over their life. The maximum lifespan of a steelhead is approximately nine years (Moyle 2002). In addition to transforming into individuals capable of survival in the ocean, younger juveniles or those which have not entered the smolt stage may disperse downstream and rear in mainstem, estuarine, and lagoon habitats. This is thought to be an integral phase of salmonid life history at a time when physiological adaptation, foraging, and refugia from predators are critical (Healy 1982, Simenstad 1982a, b). Because rearing juvenile steelhead often migrate downstream in search for available habitat (Bjornn 1977), significant percentages of the juvenile population can end up rearing in coastal lagoons and estuaries (Zedonis 1992, Shapavalov and Taft 1954).

Studies of coastal *O. mykiss* populations in central and southern California reveal three principal life-history groups, which NMFS has designated as fluvial-anadromous, lagoon-anadromous, and freshwater resident (Boughton *et al.* 2007, Smith 1990, Bond 2006). Both anadromous groups classify as winter steelhead, in that adults migrate during the winter rainy season. Lagoon-anadromous fish spend either their first or second summer as juveniles in a seasonal lagoon at the mouth of a stream (Boughton *et al.* 2006).

B. Status of S-CCC Steelhead DPS

The S-CCC steelhead DPS includes all naturally spawned steelhead populations in streams from the Pajaro River watershed (inclusive) to, but not including, the Santa Maria River, (71 FR 834) in northern Santa Barbara County, California. This DPS does not include any artificially propagated steelhead stocks residing within the historical geographic range of the S-CCC steelhead DPS.

The S-CCC steelhead DPS has four biogeographic population groups (BPG): Interior Coast Range, Carmel Basin, Big Sur Coast, and San Luis Obispo Terrace. Each biogeographic population group is comprised of populations (except for the Carmel Basin which is its own biogeographic population). For example, the Interior Coast Range includes the Salinas River and the Pajaro River populations. The analyses criteria for a population, population groups, and the DPS to be viable are described below.

Analyses suggest, when lacking specific information on population variability, it is necessary to maintain a mean run size of at least 4,150 spawners per year in order to achieve 95 percent chance of persistence for 100 years in the S-CCC steelhead DPS (Boughton *et al.* 2007, Table 1). Additional viability thresholds include meeting the mean annual run size during poor ocean conditions and that all 4,150 spawners are anadromous (the viability threshold for population density is unknown at present).

This criterion applies to the generalized situation in which there is no quantitative data on population variability. Alternatively, quantitative data on specific populations, if collected, could be used to determine a more refined criterion that for many populations would be significantly less stringent (*i.e.,* allow a smaller mean run size) but equally risk-averse.

Table 1. Viable populations necessary for DPS viability and subsequent number of spawners per biogeographic region (Boughton *et al.* 2007)

Biogeographic Region	Number of viable populations	Number of spawners per year
Interior Coast Range	4	16,600
Carmel Basin	1	4,150
Big Sur	3	12,450
San Luis Obispo Terrace	5	20,750

At the DPS level, there are three viability thresholds that must be met to ensure biogeographic diversity (NMFS 2007): 1) the appropriate number of viable populations; 2) viable populations inhabit watersheds with drought refugia; 3) viable populations are separated from one another by at least 68 kilometers (42 miles) if possible (if not possible, then the viable populations should be as widely dispersed spatially as possible); and 4) viable populations exhibit all three life-history types (fluvial anadromous, lagoon anadromous, and freshwater resident) (NMFS 2007).

During the past 30 years, annual steelhead runs within the S-CCC steelhead DPS have declined dramatically from estimated annual runs totaling 25,000 adults to less than 500 returning adult fish (Busby *et al.* 1996). While a majority of watersheds historically supporting *O. mykiss* are still occupied, steelhead run-sizes have been sharply reduced in most watersheds – all four of the largest watersheds (Pajaro, Salinas, Nacimiento/Arroyo Seco, and Carmel rivers) have experienced declines in run-sizes of 90 percent or more (Boughton *et al.* 2006), and steelhead are extirpated from many of their subwatersheds. NMFS' Biological Review Team (BRT) is concerned the two larger river systems, the Pajaro and Salinas basins, are much degraded and have steelhead runs significantly reduced in size (Good *et al.* 2005). The Pajaro and Salinas basins are ecologically distinct from the populations in the Big Sur area and San Luis Obispo County; therefore, their degradation affects the DPS's spatial structure and diversity (Good *et al.* 2005). The Interior Coast Range populations (*e.g.*, Pajaro and Salinas basins) are likely to be highly variable, due to their inland position (less winter rainfall, and prone to hot dry summers) and the long migration corridors though alluvial valleys that were likely to have been impassable in some drought years even before the development of water resources in these basins (Boughton 2006). The strongest BRT concern was for spatial structure, but abundance and productivity were also a concern (Good *et al.* 2005). A much larger (on average) run is likely necessary in the Interior Coast Range in order to compensate for the high year-to-year variability in run size (Boughton 2006).

The Carmel River Basin BPG, is one of the smallest of the four BPG regions in the S-CCC steelhead domain. The main axis of the Carmel River Watershed is just 28 miles long, in contrast to the neighboring Interior Coast Range BPG of 180 miles long. This BPG shares some similar physical characteristics with the Interior Coast Range BPG region, such as general northwest-southeast watershed orientation, landform evolution largely influenced by tectonic activity associated with the San Andreas Fault. In general, the coastal regions and higher elevations receive higher amounts of precipitation. The Carmel River is relatively steep and most of the tributaries are naturally perennial. There are seven major perennial tributaries to the Carmel River. Average annual precipitation in the region is relatively low, and shows high spatial variability. The Carmel River BPG is considered unique from the other BPGs in the DPS in that the watershed provides habitat that results in a population that possesses both interior and coastal population attributes. As such, the Carmel River run of S-CCC steelhead is considered highly valuable compared to other populations within the DPS. It serves as an "anchor" and may provide frequent and occasional dispersal to the smaller coastal populations, which are not considered viable and would not likely persist otherwise. Therefore, the Carmel River S-CCC steelhead run is one of the core populations within the DPS that is targeted for increased conservation and recovery efforts as it significantly contributes to the recovery of the DPS.

Further detailed information on this steelhead DPS is available in the NMFS' Status Review of West Coast Steelhead from Washington, Idaho, Oregon, and California (Busby *et al.* 1996), the NMFS' final rule for listing steelhead (62 FR 43937), and the NMFS' Status Review for Klamath Mountains Province Steelhead (Busby *et al.* 1996). Additional recent information is available from NMFS' Southwest Fisheries Science Center (SWFSC). The SWFSC has prepared several reports specifically for recovery planning that provide: 1) characterization of the S-CCC steelhead DPS historical population structure; 2) draft viability criteria for recovery; 3) assessment of threats; and 4) recommendations for recovery of the highest priority populations (NMFS 2006a; NMFS 2006b; NMFS 2007).

C. Status S-CCC Steelhead DPS Designated Critical Habitat

In designating critical habitat, NMFS considers the following requirements of the species: 1) space for individual and population growth, and for normal behavior; 2) food, water, air, light, minerals, or other nutritional or physiological requirements; 3) cover or shelter; 4) sites for spawning, reproduction, and rearing offspring; and, generally, 5) habitats that are protected from disturbance or are representative of the historic geographical and ecological distributions of this species (50 CFR 424.12(b)). In addition to these factors, NMFS also focuses on known physical and biological features called primary constituent elements (PCEs) within the designated area that are essential to the conservation of the species and that may require special management considerations or protection.

For the S-CCC steelhead DPS, approximately 1,832 miles of stream habitat, and 442 square miles of estuarine habitat are designated critical habitat (70 FR 52488). Critical habitat for the DPS has been designated in the following CALWATER Hydrologic Units: Pajaro River, Carmel River, Santa Lucia, Salinas, and Estero Bay. Tributaries in the Neponset, Soledad, and Upper Salinas Valley Hydrologic Sub-areas (HSA) were excluded from critical habitat and Department of Defense lands in the Paso Robles and Chorro HSAs were excluded.

NMFS developed a list of PCEs specific to salmon and steelhead and relevant to determining whether occupied stream reaches within an HSA fit the definition of "critical habitat." These PCEs include sites essential to support one or more of the life stages of the DPS (*i.e.,* sites for spawning, rearing, migration, and foraging). These sites in turn contain physical or biological features essential to the conservation of the DPS (for example, spawning gravels, water quality and quantity, side channels, forage species). Specific types of sites and the features associated with them include, but are not limited to, the following:

1. Freshwater migration corridors free of obstruction and excessive predation with adequate water quantity to allow for juvenile and adult mobility; cover, shelter, and holding areas for juveniles and adults; and adequate water quality to allow for survival.

2. Freshwater spawning sites with water quantity and quality conditions and substrate supporting spawning, incubation, and larval development.

3. Freshwater rearing sites with sufficient water quantity and floodplain connectivity to form and maintain physical habitat conditions and allow salmonid development and mobility; sufficient water quality to support growth and development; food and nutrient resources such as terrestrial and aquatic invertebrates and forage fish; and natural cover such as shade, submerged and overhanging large wood, log jams, beaver dams, aquatic vegetation, large rocks and boulders, side channels, and undercut banks.

4. Estuarine areas that provide uncontaminated water and substrates; food and nutrient sources to support growth and development; and connected shallow water areas and wetlands to cover and shelter juveniles.

The coastal drainages used by the S-CCC steelhead DPS provide relatively high productivity of the freshwater rearing PCE, maintain connectivity, and result in a wide distribution of the species. Inland HSAs provide important freshwater migration, freshwater spawning, and freshwater rearing PCEs unique within the inland ecotype. However, most areas of critical habitat have been degraded (as described below in *Threats to the S-CCC Steelhead DPS and Critical Habitat*) compared to conditions that once supported thriving populations of steelhead.

D. Threats to the S-CCC Steelhead DPS and Critical Habitat

Of the watersheds in the S-CCC steelhead DPS historically supporting steelhead, most continue to support runs, although run sizes are significantly reduced, or no longer exist in many sub-watersheds. A reduced population size causes each individual within the population to be more important and significantly increases the susceptibility to small or catastrophic events. Moreover, low population sizes compromise genetic integrity, posing serious risks to steelhead survival and recovery. As mentioned previously the four largest watersheds (Pajaro, Salinas, Nacimiento/Arroyo Seco, and Carmel rivers) have experienced declines in run sizes of 90 percent or more, and steelhead are extirpated from many of their subwatersheds primarily due to anthropogenic and environmental influences.

1. Anthropogenic Influences

Habitat destruction and fragmentation have been linked to increased rates of species extinction over recent decades (Davies *et al.* 2001). A major cause of the decline of steelhead is the loss or decrease in quality and function of essential habitat features (*i.e.*, PCEs). Most of this loss and degradation of habitat, including critical habitat, has resulted from anthropogenic watershed disturbances caused by water diversions, the influences of large dams, agricultural practices (including irrigation), urbanization, loss of wetland and riparian areas, roads, grazing, gravel mining, and logging. While individual components of this list of threats have fluctuated over the last 100 years, the general trend has been one of increasing and intractable pressure on aquatic resources. This degradation of critical habitat is occurring because of the loss of essential habitat components necessary for steelhead persistence. Degradation of critical habitat has reduced its value for steelhead conservation and exacerbated the adverse effects of natural environmental variability such as drought, poor ocean conditions, and predation (62 FR 43937; Titus *et al.* 2006).

a. Water Use

Depletion and storage of natural flows have altered natural hydrological cycles in many California rivers and streams in general, including streams providing habitat to the S-CCC steelhead DPS in particular. Alteration of stream flows has increased juvenile salmonid mortality for a variety of reasons including: impaired migration from insufficient flows or habitat blockages; loss of rearing habitat due to dewatering and blockage; stranding of fish resulting from rapid flow fluctuations; entrainment of juveniles into unscreened or poorly screened diversions; and increased juvenile mortality resulting from increased water temperatures (Chapman and Bjornn 1969, Bergren and Filardo 1993, 61 FR 56138). However, the greatest threats to the S-CCC steelhead DPS population are the degradation of habitats and loss of habitat by impassable dams. In fact, the SWFSC identified re-establishing access to upper watersheds in the Pajaro and Salinas watersheds as one of the highest priorities for the recovery of the S-CCC steelhead DPS (NMFS 2006a, 2007).

b. Fishing Harvest

There are few good historical accounts of the abundance of steelhead harvested along the California coast (Jensen and Swartzell 1967). However, Shapovalov and Taft (1954) report that very few steelhead were caught by commercial salmon trollers at sea but considerable numbers were taken by sports anglers in Monterey Bay. There are also many anecdotal reports of recreational fishing and poaching of instream adults (Franklin 2005) which suggests a relatively high level of fishing pressure. California regulations allow catch-and-release winter-run steelhead angling in many of the river basins occupied by the DPS, specifying that all wild steelhead must be released unharmed (NMFS 2003). Although it should be noted that even catch and release fishing exerts adverse effects on listed fish.

c. Artificial Propagation

There are no steelhead hatcheries operating in or supplying hatchery reared steelhead to the DPS. However, there is an extensive stocking program of hatchery cultured and reared, non-anadromous *O. mykiss* which supports a put-and-take fishery (*e.g.*, Nacimiento River). These stockings are now generally conducted in non-anadromous waters (though other non-native game species such as smallmouth bass (*Micropterus dolomieui*) and bullhead catfish (*Ameiurus sp.*) are stocked into anadromous waters by a variety of public and private entities.

While some of these programs have succeeded in providing seasonal fishing opportunities, the impacts of these programs on native, naturally-reproducing steelhead stocks are not well understood. Competition, genetic introgression, and disease transmission resulting from hatchery introductions may significantly reduce the production and survival of native, naturally-reproducing steelhead.

2. <u>Environmental Influences</u>

a. Global Climate Change

The acceptance of global climate change as a scientifically valid and anthropogenically driven phenomenon has been well established by the United Nations Framework Convention on Climate Change (UNFCCC), the Intergovernmental Panel on Climate Change, and others (Davies *et al.* 2001, Oreskes 2004, UNFCCC 2006). The most relevant trend in climate change is the warming of the atmosphere from increased greenhouse gas emissions. This warming is inseparably linked to the oceans, the biosphere, and the world's water cycle. Changes in the distribution and abundance of a wide array of biota confirm a warming trend is in progress, and that it has great potential to affect species' survival (Davies *et al.* 2001). In general, as the magnitude of climate fluctuations increases, the population extinction rate also increases (Good *et al.* 2005). Global warming is likely to manifest itself differently in different regions.

Modeling of climate change impacts in California suggests that average summer air temperatures are expected to increase (Lindley *et al.* 2007). Heat waves are expected to occur more often, and heat wave temperatures are likely to be higher (Hayhoe *et al.* 2004). Total precipitation in California may decline; critically dry years may increase (Lindley *et al.* 2007, Schneider 2007). The Sierra Nevada snow pack is likely to decrease by as much as 70 to 90 percent by the end of this century under the highest emission scenarios modeled (Luers *et al.* 2006). Wildfires are expected to increase in frequency and magnitude, by as much as 55% under the medium emissions scenarios modeled (Luers *et al.* 2006). Vegetative cover may also change, with decreases in evergreen conifer forest and increases in grasslands and mixed evergreen forests. The likely change in amount of rainfall in Northern and Central Coastal streams under various warming scenarios is less certain, although as noted above, total rainfall across the state is expected to decline. For the California North Coast, some models show large increases (75% to 200%) while other models show decreases of 15% to 30 % (Hayhoe *et al.* 2004). Many of these changes are likely to further degrade salmonid habitat by, for example, reducing stream flows during the summer and raising summer water temperatures.

b. Ocean Conditions

Variability in ocean productivity has been shown to affect salmon production both positively and negatively. Beamish and Bouillion (1993) showed a strong correlation between North Pacific salmon production and marine environmental factors from 1925 to 1989. Beamish *et al.* (1997) noted decadal-scale changes in the production of Fraser River sockeye salmon that they attributed to changes in the productivity of the marine environment. They also reported the dramatic change in marine conditions occurring in 1976-77 (an El Niño year), when an oceanic warming trend began. These El Niño conditions, which occur every three to five years, negatively affect ocean productivity. For instance, Johnson (1988) noted increased adult mortality and decreased average size for Oregon Chinook salmon (*O. tshawytscha*) and coho salmon (*O. kisutch*) during the strong 1982-83 El Niño. Brood years of salmon and steelhead that were in the ocean during the 1983 El Niño event exhibited poor survival all along the Pacific coast of California (Garrison *et al.* 1994). Of greatest importance, is not how steelhead perform during periods of high marine survival, but how prolonged periods of poor marine survival affect the viability of populations. Salmon populations have persisted over time, under pristine habitat conditions, through many such cycles in the past. It is less certain how they will fare in periods of poor ocean survival when their freshwater, estuary, and nearshore marine habitats are degraded (Good *et al.* 2005).

c. Reduced Marine-Derived Nutrient Transport

Reduction of marine-derived nutrients (MDN) to watersheds is a consequence of the past century of decline in salmon abundance (Gresh *et al.* 2000). MDN are nutrients that are accumulated in the biomass of salmonids while they are in the ocean and are then transported to their freshwater spawning sites. Salmonids may play a critical role in sustaining the quality of habitats essential to the survival of their own species. MDN (from salmon carcasses) has been shown to be vital for the growth of juvenile salmonids (Bilby *et al.* 1996, Bilby *et al.* 1998). The return of salmonids to rivers makes a significant contribution to the flora and fauna of both terrestrial and riverine ecosystems (Gresh *et al.* 2000). Evidence of the role of MDN and energy in ecosystems suggests this deficit may result in an ecosystem failure contributing to the downward spiral of salmonid abundance (Bilby *et al.* 1996). The loss of this nutrient source may perpetuate salmonid declines in an increasing synergistic fashion.

d. Marine Mammal Predation

Although Harbor seal (*Phoca vitulina*) and California sea lion (*Zalophus californianus*) numbers have increased along the Pacific coast (NMFS 1999), predation by marine mammals is not believed to be a major factor contributing to the decline of West Coast steelhead relative to the effects of fishing, habitat degradation, and hatchery practices. However, in certain situations such as at the base of a dam, pinnipeds may consume a higher percentage of listed salmonids as they will opportunistically feed upon fish that are trapped or otherwise prevented from migrating (Wright *et al.* 2007). Several foraging and diet studies of pinnipeds at the mouths of salmonid supporting rivers along the coast of California indicate that bottom fishes and schooling fishes were the most commonly occurring fish species found in pinniped fecal samples, with salmonids comprising a very low percentage of their diets (NMFS 1999).

V. ENVIRONMENTAL BASELINE

The environmental baseline is the current status of species and critical habitat in the action area based on analysis of the effects of past on ongoing human and natural factors. The environmental baseline includes the past and present impacts of all Federal, State, or private actions and other human activities in the action area, the anticipated impacts of all proposed Federal projects in the action area that have already undergone formal or early section 7 consultation, and the impacts of State or private actions which are contemporaneous with the consultation in process (50 CFR 402.02).

A. Environmental Setting in the Action Area

The action area is located in the Carmel River watershed, a 255 square-mile watershed in the Santa Lucia Mountain range along the central coast of California. The Carmel River is a mid-size drainage when compared to the Salinas and Pajaro Rivers, also within the S-CCC DPS, but larger than the streams located along the Big Sur Coast and San Luis Obispo Coast south of the Monterey Bay area. In the upper watershed, the river and its tributaries flow in deep, steep-sided canyons. For its last 15 miles, the river flows across the relatively flat Carmel Valley floor to the Pacific Ocean. Two operating dams are located on the Carmel River: San Clemente Dam is located near the confluence of Carmel River and San Clemente Creek at about RM 18.5, and Los Padres Dam is located at about RM 23.5. Major tributaries include Garzas Creek and Tularcitos Creek below San Clemente Dam, and San Clemente Creek, Pine Creek, and Cachagua Creek between San Clemente Dam and Los Padres Dam (Duffy 1998).

Over 90 percent of the average annual precipitation within the Carmel River watershed occurs between November and April, with January and February being the wettest months. In the rainy season, runoff from the upper watershed refills the Los Padres Reservoir, which is usually lowered during the preceding warm, dry summer months. San Clemente Reservoir remains full year round. After the reservoir is filled, water overflows to the lower mainstem (Duffy 1998). Because of water withdrawals from the aquifer underlying the river, flow in the lower mainstem of the river does not reach the lagoon at the mouth of the river until substantial fall or winter rains have raised river levels and recharged the aquifer. Sustained flows of approximately 400 cubic ft per second (cfs) past the dams for several days are necessary before the aquifer is recharged to the point where flows in the lower mainstem reach the Lagoon. The Carmel River Lagoon is a naturally occurring lagoon and wetlands area located at the mouth of the Carmel River, where the river flows to the Pacific Ocean at Carmel Bay.

A. Status of the S-CCC steelhead DPS in the Action Area

The California Advisory Committee on Salmon and Steelhead (CACSS 1988) cited an estimate of 20,000 steelhead in the Carmel River in 1928. Although CDFG (1965) estimated 27,750 steelhead spawning in many rivers of this DPS in the mid-1960s, McEwan and Jackson (1996) reported runs ranging from 1,000 to 2,000 in the Pajaro River in the early 1960s, and Snider (1983) estimated annual escapement of about 3,200 steelhead for the Carmel River for the 1964-75 period (Busby *et al.* 1996). Compared to any other single stream for the DPS, the Carmel River presently maintains the largest adult run.

Presently there is no hatchery production within this DPS. There were small private and cooperative programs producing steelhead, as well as one captive broodstock program intended to conserve the Carmel River steelhead strain (McEwan and Jackson 1996). Most hatchery stocks used in this region originated from stocks indigenous to the DPS, but many were not native to their local river basins (Bryant 1994). Little information exists on the actual contribution of hatchery fish to natural spawning.

A combination of ladder counts, spawning redd surveys, and angler surveys estimate that, in the absence of angling, about one half (55 percent) of the adults that enter the Carmel River move upstream of the San Clemente Dam (Dettman and Kelly 1986). An estimate of the total steelhead run in the Carmel River in 1984 was 860 adults (Jones and Stokes 1998). Between 1987 and 1991, a drought occurred in the region and no outflow through the river mouth occurred in 1988, 1989, and 1990. No steelhead entered the system during these four years. However, adult steelhead returns at the San Clemente Dam fish ladder have fluctuated considerably since 1965. Since the installation of the fish monitor in 1994, the count has peaked at 874 fish in 1998, indicating that the population appears to have recovered from the effects of the 1987-1991 drought. The 1997 and 1998 totals were the highest counts at San Clemente Dam since 1975 (775 and 874, respectively; Jones and Stokes 1998). From 1999-2002, steelhead adults returning to the San Clemente Dam numbered 409, 477 (Entrix 2000), 804 (MPWMD 2001), and 642, respectively. Ladder counts recorded 483 adults in the 2002-2003 season. Current information from the seasons between 2003 and 2009 recorded adult counts at the dam to be 388, 328, 368, 222, 412, and 95 (MPWMD 2003-2009).

Downstream of the San Clemente Dam, the Carmel River supports a significant portion of the juvenile steelhead rearing in the lower Carmel River (action area). Because of this, NMFS has consistently ranked the Carmel River as the most potentially viable steelhead watershed in the DPS. Juvenile densities in the lower 15.5 miles of river appear to be similar to the reach from RM 16 through the upstream limit of the San Clemente Reservoir (at about RM 20). There are indications that stream restoration and vegetation management activities along the lower river are leading to improvements in the instream substrate and vegetative cover along the streamside corridor, thus, likely improving spawning and rearing habitat. The MPWMP reported the mapped area of riparian forest has increased by nearly 50% between 1986 and 2006 (MPWMP

2010). However, the downward trend of adult returns (listed above) remains a concern and is probably due to other factors influencing survival such as impacts from water diversions, inadequate fish passage into the upper watershed, lagoon management, and changes in ocean conditions.

B. Factors Affecting Critical Habitat Conditions in the Carmel River Watershed and Action Area

Habitat for freshwater rearing and spawning of steelhead in the Carmel River watershed, including the action area, is affected by a number of factors. Land use activities associated with road construction, urban development, agriculture, water development projects, and recreation have significantly altered habitat quantity and quality through: alteration of stream bank and channel morphology, alteration of ambient stream water temperatures, degradation of water quality, elimination of spawning and rearing habitat, fragmentation of available habitats, elimination of downstream recruitment of gravel and LWD, and removal of riparian vegetation resulting in increased stream bank erosion. Agricultural practices and urban encroachment on the floodplain have eliminated large trees and logs and other woody debris that would have been otherwise recruited to the stream channel. LWD influences stream morphology by affecting pool formation, channel pattern and position, and channel geometry. These factors are discussed in detail below.

1. Dams

California American Water (Cal-Am) owns three dams on the main stem of the Carmel River: San Clemente Dam, Los Padres Dam, and the Old Carmel River Dam (OCRD). San Clemente Dam is located near the confluence of Carmel River and San Clemente Creek (RM 18.6), is 106 ft high, and was completed in 1921. Los Padres Dam, completed in 1949, is 148 ft high and is located about six miles upstream of San Clemente Dam (RM 24.6). A fish ladder on the south side of San Clemente Dam was constructed when the dam was built. At Los Padres, a trap and truck operation is used to pass fish over the dam. Presently, excessive sedimentation from natural events, such as the Marble Cone and Kirk Complex fires, and man-made sources has reduced the capacity of the Los Padres Reservoir from 3,030 acre-ft (AF) in 1949 to an estimated 1,786 AF in 2008 (Smith *et al.* 2009) and San Clemente Reservoir from 1,425 AF in 1921 to less than 132.25 (Entrix 2010).

Operations of both dams are coordinated to regulate streamflow and to supply water to users in the Carmel Valley and on the Monterey Peninsula via the Carmel Valley Filter Plant. The two dams are operated by Cal-Am in accordance with quarterly water supply budgets developed in cooperation with the MPWMD, NMFS, and CDFG. Under a Memorandum of Agreement (MOA) between MPWMD, CDFG, and Cal-Am, releases are maximized from San Clemente Reservoir to maintain rearing habitat for juvenile steelhead in the river downstream during the low flow season. Los Padres Dam is operated by Cal-Am to maintain as much water as possible in the reservoir and to maintain a minimum streamflow requirement of five cfs below Los Padres Dam throughout the July through December period.

Approximately 0.5 miles downstream of San Clemente Dam is the OCRD, which was completed in 1883 by the Pacific Improvement Company to provide sufficient water to support the Del Monte Hotel and the Los Laureles Rancho. This dam no longer operates as a water diversion facility and causes problems with adult fish passage during upstream migration periods. Adults have difficulty finding the entrance to the ladder, move upstream past the entrance, and attempt to jump the dam, often injuring themselves in the effort. During years when flow conditions make it difficult to find the ladder entrance, a higher proportion of fish with injuries to the snout and head arrive at Los Padres Dam. The dam is also about three ft thick at the crest, which creates an area of high velocity over the top of the dam that fish must immediately accelerate through upon completing their jump. This combination of factors makes fish passage at this facility problematic (Entrix 2000). A notch has been cut in the dam to allow easier passage for steelhead at lower flows.

The three dams on the Carmel River delay and restrict passage for upstream migrating adults and downstream migrating juveniles, smolts, and kelts. This has resulted in lower steelhead abundance and productivity in the upper watershed. Densities of steelhead rearing above Los Padres Reservoir were assessed by Kelley (1983) to be one third that of comparable sized streams. The reservoirs behind the dams also contribute to increased water temperatures downstream, which have been recorded at near lethal limits for steelhead (MPWMD 1999).

2. River Channel Morphology

After completion of San Clemente Dam in 1921, the channel downstream of the dam began a process of incision and armoring as a result of the lack of bedload in flows from San Clemente Reservoir. Armoring is common downstream of dams as fine riverbed materials are washed downstream without a source of replacement, leaving only coarse materials that prevent further erosion of the riverbed (except during the largest floods). The process of incision and armoring continued until about 1940, when a new dynamic equilibrium was established. After completion of the Los Padres Dam in 1949, this process was repeated in the reach between the two dams but on a smaller scale due to the presence of bedrock controls and the limited amount of alluvial material in the channel. This incision increased the depth and speed of water flow and the rate of bank erosion, although erosion was limited by the growth of riparian vegetation along the newly cut banks (Jones and Stokes 1998). In some reaches of the river, the channel deepened by up to 13 ft. As a result of the incised channel, flooding on the floodplains decreased. This allowed residential and commercial properties to develop in the floodplain. Numerous golf courses and private residences are now built along the Carmel River.

The change in river channel morphology and armoring of the channel has eliminated spawning gravels for a distance of approximately two miles below San Clemente Dam. The lack of gravels in this section of the river also has changed and eliminated riffles, important in the production of prey sources for rearing steelhead. The increased development of the floodplain has created a much greater emphasis on flood protection and preventing erosion of banks, resulting in the placement of hard structures such as bare rip-rap, concrete rubble, cement walls, and cars, *et cetera*, along a high percentage the lower river (approximately 35-40 percent of the river between RM .5-15.5 has been altered in some manner). The use of these hard structures has significantly degraded the habitat value of much of the lower 18 miles of river.

3. <u>Water Withdrawals from the Underflow of the Carmel River</u>

A number of wells, which pump water from the underflow of the Carmel River, are located downstream of the two dams. Cal-Am operates 21 of these wells and is the largest holder of a water right on the river. Cal-Am has a legal water right for 3,376 AF and diverts an additional 10,730 AF from the Carmel River. State Water Resources Control Board (SWRCB) Order 95-10, as amended, orders Cal-Am to find an alternate source for the non-legal 10,730 AF of diverted water. Additional wells are operated privately under much smaller water rights. Of these additional wells, the State Division of Water Rights has identified 14 major diverters who cumulatively divert up to 1,729 acre-ft annually from the underflow of the Carmel River. As a result of these withdrawals, the Carmel River goes dry downstream of the Narrows (RM 9.5), usually by July of each year. From July until the rains begin, the only water remaining in the lower river is in isolated pools that gradually dry up as the groundwater table declines with continued withdrawals. Similarly, surface flow into the lagoon normally recedes in late spring and ceases in summer as rates of water extraction from the river and alluvial aquifer exceed baseflow discharge (Duffy 1998).

The cumulative effects of the water withdrawals and the resulting drying up of half of the lower river reduce the steelhead rearing capacity of the lower river from approximately 138,000 (Kelley 1983) to 70,000 (MPWMD 2001). The lowered groundwater tables and drying of the lower river also diminish the window of time available for migration of adults in the fall and winter and outmigration by smolts in the spring and summer. Substantial rainfall is needed to recharge the aquifer before surface flows reach the ocean. In the drought years of 1987 to 1992, the river failed to reach the ocean for four years. Reduced surface flows and lowered groundwater tables also create poor water quality conditions and lowered water levels in the Carmel River Lagoon, which result in reduced growth and mortality of rearing fish.

In 1990, MPWMD certified the Water Allocation Program Final Environmental Impact Report which set water allocation limits for annual Cal-Am water production (Jones and Stokes 1998). A mitigation program was included to mitigate for significant environmental impacts from Cal-Am's diversions. This mitigation plan provides for: expansion of the program to capture and transport smolts during spring, prevention of stranding of early fall and winter juvenile migrants, rescuing of juveniles downstream of Robles del Rio during summer, and implementation of an experimental smolt transport program at Los Padres Dam (1998-99 Annual Report, MPWMD 1999).

a. Sleepy Hollow Rearing Facility

Under the MPWMD mitigation program, the Sleepy Hollow Steelhead Rearing Facility was constructed in 1997 to hold and rear juveniles, which are rescued during the summer months when the lower reaches of the river become dry. Although there have been some difficulties encountered with early operations of the Sleepy Hollow Steelhead Rearing Facility, significant upgrades and modifications have been made over the past ten years to the facility to improve operations. These include: 1) a cooling tower, 2) large emergency generator, 3) upgraded impellers on the existing pumps, 4) purchases and installation of additional backup pumps and a mobile emergency pump, 5) installation of a centrifugal separator to reduce the buildup of coarse sediment in the cooling tower and rearing channel, 6) new wooden weir boards installed in the rearing channel to prevent fish movement between bays, and 7) installation of eight, 250-gallon, insulated rearing troughs. The continued rescue and relocation efforts of juvenile fish have likely improved the Carmel River S-CCC steelhead population's ability to survive. Without the conservation efforts of this facility, many juvenile steelhead would become stranded during the dry summer months, with no chance of survival.

4. Loss of Riparian Vegetation

In the mid- and late 1970s, a considerable amount of riparian vegetation was lost due to the 1976-1977 drought and increased groundwater pumping that lowered the water table in parts of the Carmel Valley. With the banks unprotected by riparian vegetation, the river adjusted to subsequent flood flows by eroding both the channel bed and the banks. As a result of this process, a middle reach of the river between the Garland Ranch Regional Park and Schulte Road changed drastically from a narrow, deep, meandering channel with well-developed riffles and pools to a wide, shallow channel with eroded banks and an unstable bed. Flood flows in 1995 and 1998, which were the highest since the USGS began recording flows at Robles del Rio in 1958, widened many portions of the river between Schulte Road and Highway 1 (Jones and Stokes 1998).

The lowered ground water levels from excessive water withdrawal and the subsequent die-off of riparian vegetation also contributed to bank erosion and destabilization of the river channel. This has endangered riverside properties that were developed after the river incised. Before 1984, property owners took action individually to prevent bank erosion and property loss. Many different types of protective works were installed, including native fill, levees, gabion baskets, car bodies, used appliances, tires, jacks, sheet pilings, rock rip-rap, concrete rubble, concrete blocks, "sackcrete" (wetted-down sacks of cement), masonry bricks, and large posts with gabion wire (Jones and Stokes 1998). Multiple sites along the length of the Carmel River have been hardened for bank protection, resulting in a loss of habitat for steelhead.

Since 1980, the MPWMD has monitored the health of the Carmel River riparian corridor closely. The Riparian Corridor Management Program, which is mitigation for the Water Allocation Program, integrates MPWMD's many riparian mitigation and management activities into one program. The goal of this plan is the rehabilitation, restoration, enhancement, and preservation of the streamside corridor along the Carmel River (1998-99 Annual Report, MPWMD 1999). Mitigation measures include erosion control, revegetation, irrigation, and channel clearing. The channel clearing, intended to increase flood flow capacity and diminish scour of banks and levees, reduces the habitat value of the stream corridor by removing important aspects of instream cover and habitat-forming downed trees.

5. Implementation of Activities Covered under the Corps RGP for the years 2004-2009

Between 2004 and 2009, work occurred at 28 sites within the action area. Most of the work involved vegetation management (26 sites). There were two bridge maintenance projects, and one bank stabilization project. For all three projects, approximately 250 cubic yards of fill were placed in the stream channel along a combined total of 150 linear feet of stream. However, at one site, approximately 200 cubic yards of unauthorized material (cement and concrete debris) was removed from the stream and then replaced with 200 cubic yards of rip-rap along 125 linear ft of stream bank at this site. The slope was covered with native channel material (sand and gravel) and revegetated with native willow and cottonwood cuttings. The length of stream affected by vegetation management during the five year period was approximately 4,885 lineal feet. During the five year period, there was no recorded mortality of S-CCC steelhead.[4]

Data provided by the MPWMD for the five year period indicated erosion only occurred along approximately 400 feet of the stream. In comparison to the period between 1978 and 1998, when bank erosion occurred along virtually every reach of the 15.5-mile alluvial section of the Carmel Valley, the amount of bank erosion between 2004 and 2009 was remarkably low. The MPWMD attributes this to three factors: 1) about 35-40 percent of the stream banks have been hardened or otherwise altered to resist erosion; 2) peak stream flows in the winter did not exceed the five-year return flow magnitude; and 3) streamside vegetation along much of the river was recovered substantially from the effects of flood, drought, and groundwater extraction between the 1970's and 1990's. NMFS notes that the lower five miles of the river, where the summer diversions are concentrated, exhibit many signs of an unstable system (localized bank scour at low flows, sparsely vegetated areas along the banks, scour of infrastructure and previously installed erosion protection). In general, based upon pre and post project vegetation and bank stability monitoring conducted by MPWMD staff, habitat conditions within the project areas covered under the RGP have improved based upon increases in bank stability and vegetation cover and diversity.

VI. EFFECTS OF THE PROPOSED ACTION

The purpose of this section is to identify the direct and indirect effects of the proposed action, and any interrelated or interdependent activities, on threatened S-CCC steelhead and its designated critical habitat. Data to quantitatively determine the precise effects of the proposed action on this species and its critical habitat are limited or not available; the assessment of effects therefore focuses mostly on qualitative identification. This approach was based on knowledge and review of the ecological literature concerning the effects of loss and alteration of habitat elements important to salmonids, including the PCEs of critical habitat. This information was used to gauge the likely effects of the proposed project via an exposure and response framework that focuses on what stressors (physical, chemical, or biotic), directly or indirectly caused by the proposed action, that salmonids and their critical habitat are likely to be exposed to. Next, we evaluate the likely response of salmonids and critical habitat to these stressors in terms of changes to salmonid survival, growth and reproduction, and changes to the ability of PCEs to

4 All projects completed over the past five years occurred along the stream banks or during dry conditions which did not require dewatering, or fish handling and relocation.

support the value of critical habitat.

Effects to listed S-CCC steelhead and their critical habitat caused by activities associated with this project will depend upon the amount, scope, and specific locations of potential projects. In addition, emergencies, such as floods or severe storms, would significantly influence the activities proposed in the future. The following general categories of activities that could create adverse effects to listed steelhead and critical habitat during project construction identified by NMFS are:

- injury or death of fish due to dewatering or water diversions;
- impediment to upstream or downstream migration by listed steelhead during water diversion/bypass construction activities;
- injury or death due to toxics, metals, and/or petroleum products from machinery;
- degradation of water quality and/or channel structure from turbidity or sediment plumes;
- loss of riparian vegetation due to construction;
- harassment, or loss of habitat from in-water construction activities;
- habitat degradation from construction access and temporary stream crossings;
- loss of LWD and in-channel vegetation from channel clearing;
- habitat degradation from sand and gravel bar excavation; and
- bank alterations and associated habitat loss and long-term channel changes (*e.g.*, bank stabilization, rock slope protection).

Most projects would occur in degraded areas, none are expected in areas with pristine conditions. In many cases, the degraded areas of the river exhibit three characteristics: 1) little or no riparian vegetation, 2) unstable (steep) stream banks, and 3) braided channels with large mid-stream gravel bars. All projects are expected to result in overall beneficial effects to threatened steelhead and their critical habitat. Only actions consistent with the minimization measures provided in the project description section of this opinion shall be covered under this programmatic biological opinion.

A. Adverse Effects to Threatened Steelhead

1. Injury or Death Due to Dewatering or Water Diversions

Stream flow diversions could adversely affect individual steelhead by concentrating or stranding them in residual wetted areas (Cushman 1985) or causing them to move to adjacent habitats with poor habitat conditions that decrease their fitness (Clothier 1953, Clothier 1954, Kraft 1972, Campbell and Scott 1984). Dewatering the workspace may injure or kill steelhead by temporarily confining them to areas predisposed to dewatering or desiccation, increased water temperature, decreased dissolved oxygen concentration, and predation (Cushman 1985).

Dewatering and diversions implemented under the RGP will occur only between July 1 and October 31 of any year, with the dewatering and/or diversion being completely removed by October 31. This timing avoids the migration and spawning season for steelhead. Therefore, adverse effects to steelhead adults, migration corridors, or spawning habitat are not expected to occur. However, rearing juveniles are likely to be present. In order to minimize adverse impacts to juvenile steelhead, juvenile fish will be captured and relocated from the construction area prior to work commencing. Juvenile S-CCC steelhead will be captured via electrofishing, seining and/or dip netting, then placed in insulated, oxygenated tanks filled with Carmel River water, and transported to adjacent suitable habitat or the Sleepy Hollow facility.

Fish relocation activities pose a risk of injury or mortality to rearing juvenile steelhead. Any fish collecting gear, whether passive (Hubert 1996) or active (Hayes *et al.* 1996), has some associated risk to fish, including stress, disease transmission, injury, or death. The amount of unintentional injury and mortality attributable to fish capture varies widely depending on the method used, the ambient conditions, and the expertise and experience of the field crew. Since fish relocation activities will be conducted by qualified fisheries biologists following NMFS guidelines, direct effects to, and mortality of, juvenile steelhead during capture will be minimized. MPWMD personnel are highly experienced at capturing and relocating juvenile steelhead therefore, based on similar relocation efforts NMFS is familiar with, approximately two percent of the fish may be injured or killed during relocation activities. Those fish that avoid capture may be exposed to risks described in the following section on flow diversion and dewatering.

Stream flow diversion and project site dewatering are expected to cause temporary loss, alteration, and reduction of aquatic habitat. NMFS anticipates temporary changes in stream flow within and downstream of project sites during diverted flow and dewatering activities. These fluctuations in flow are anticipated to be small, gradual, and short-term. Stream flow in the vicinity of the project sites should be similar to free-flowing conditions, with small elevations in water velocity through the impinged channel running parallel to the diversion dam (if used). High flow is not expected during the time of construction so these fluctuations are not expected to deter fish from passing through the action area. Stream flow diversions could harm individual rearing smolt and juvenile steelhead by concentrating or stranding them in residual wetted areas before they are relocated (Cushman 1985). Rearing steelhead could be killed or injured if crushed during diversion activities, though direct mortality is expected to be minimal due to relocation efforts prior to dewatering. Juvenile S-CCC steelhead that avoid capture in the project site will die during dewatering activities through stranding. NMFS expects for the number of juvenile steelhead that will be killed (no more than one percent) as a result of stranding during dewatering activities to be less than those killed during relocation (no more two percent).

Although sites selected for relocating fish should have ample habitat, in some instances relocated fish may endure short-term stress from crowding at the relocation sites. Relocated fish may also have to compete with other fish causing increased competition for available resources such as food and habitat (Keeley 2003). Some of the fish released at the relocation sites may choose not to remain in these areas and may move either upstream or downstream to areas that have greater habitat availability and a lower density of fish. As each fish moves, competition remains either localized to a small area or quickly diminishes as fish disperse. NMFS cannot accurately estimate the number of fish affected by competition, but does not believe this impact will be large enough to affect the survival chances of individual fish. Once the project is complete, juvenile steelhead migration and rearing space will return to the dewatered area.

The amount of mortality of S-CCC steelhead due to dewatering, capture and relocation is dependent upon the number and types of projects carried out annually. The RGP limits MPWMD maintenance and restoration projects to approximately 2,600 linear ft and privately-sponsored projects to 1,000 linear ft. MPWMD conducts surveys of rearing juveniles during October of each year and has documented average juvenile densities of 0.31-1.83 fish/linear ft. with an average of 0.88 fish/linear ft. from 1990-2008. Juvenile densities may be higher in the upper reaches (generally reaches above RM 9) of the Carmel River during the summer months that coincide with RGP activities. Therefore, MPWMD estimates summer densities of approximately 1.5 fish/linear ft. in areas maintaining summer flow of the project area. Assuming a fish density of 1.5 fish/linear ft, a maximum of 3,600 ft of dewatering/relocation completed per year, and a mortality of one percent due to stranding during dewatering and two percent from handling during capture and relocation, RGP activities could result in capture and relocation of 5,400 juvenile steelhead and mortality to approximately 54 juvenile steelhead due to stranding (1%) and 108 due to handling (2%) per year (1.5 fish/ft * 3,600 ft = 5,400 fish; 5,400 fish * 0.03 = 162 total per year).

2. Impediment to Upstream or Downstream Migration during Water Diversion/Bypass Construction Activities

As discussed above under *Status of the Species*, adult steelhead migrate upstream to spawning areas and downstream to the ocean after spawning, and juvenile steelhead migrate both upstream and downstream throughout the year to utilize more favorable habitat or to travel to the ocean during spring as smolts. Loss of passage results in delayed completion or termination of behavioral or life history patterns required for the survival of listed steelhead.

The RGP only allows construction between July 1 and October 31 of each year with all diversions removed by October 31. Diversions implemented during this time period will not result in impediments to adults or smolts, because it is outside of the migration season for adult and smolt S-CCC steelhead. Diversions likely will impede migration of juveniles for a short duration during the seasonal work window. During this time period, the lower nine miles of the action area typically goes dry. Steelhead juveniles are rescued from this area yearly as the river begins to dry back. Any projects within the lower nine miles are expected to be implemented after dryback and rescues have occurred. As such, diversions and/or bypasses likely will not be needed. Upstream of RM 9, flow persists, and rearing habitat is available throughout the summer and fall. A bypass/diversion structure of up to 4 months (this would be the maximum amount of time diversions could be implemented within the action area during the seasonal work window) is not expected to cause injury or mortality to juveniles in this upper area, because rearing habitat is expected to be available to them both upstream and downstream of any project diversions.

3. Injury or Death due to Toxics, Metals, and/or Petroleum Products from Machinery

Oils and similar substances from construction equipment can contain a wide variety of polycyclic aromatic hydrocarbons (PAHs) and metals. Both can result in adverse impacts to salmonids. PAHs can alter salmonid egg hatching rates and reduce egg survival as well as harm the benthic organisms that are a salmonid food source (Eisler 2000). Some of the effects metals can have on salmonids are: immobilization and impaired locomotion, reduced growth, reduced reproduction, genetic damage, tumors and lesions, developmental abnormalities, behavior changes (avoidance), and impairment of olfactory and brain functions (Eisler 2000). Toxic substances from construction equipment may be released into the dry stream bed and then mobilized in late fall or winter during the first heavy rains.

Minimization measures included in the project description are expected to avoid and minimize the occurrence and/or amount of toxic substances entering the stream bed. No eggs or alevins are expected to be present during the time that machinery is used, and no toxics are expected to be released into flowing water. Should substances be released into the dry stream bed, only juveniles directly downstream of the construction area could be affected, and rains and flows are expected to quickly dilute any toxic chemicals present so that the chance of injury is minimal. As such, exposure to toxic products from activities authorized under the RGP is not expected to result in injury or mortality of S-CCC steelhead.

4. Degradation of Water Quality and/or Channel Structure from Turbidity and Sedimentation

Adverse effects on water quality may occur due to bank disturbance, loss of riparian habitat, increases in water temperature or biological oxygen demand from losses in riparian cover or changes in channel morphology, and/or increases in fine sediments. Water quality degradation may: affect the ability of fish to feed, block or delay juvenile or adult steelhead migration, cause juvenile steelhead to move into areas of higher predator density, and/or cause short- or long-term physiological damage that ultimately prevents a listed steelhead from successfully reproducing.

a. Turbidity

Turbidity refers to the amount of light scattered or absorbed by a fluid. Elevated levels of turbidity may result when fine sediment is contributed to the river or mobilized during construction. Turbidity due to suspended sediment is likely low in the river throughout most of a given year. Suspended sediment produces little or no direct mortality on adult fish at levels observed in natural, relatively unpolluted streams (Waters 1995). High concentrations of suspended sediment can result in direct mortality (Lloyd 1987, Sigler *et al.* 1984, McLeay *et al.* 1984, McLeay *et al.* 1983) or deleterious sublethal effects to fish, including reduced feeding efficiency and decreased food availability (Velagic 1995, Gregory and Northcote 1993, Reynolds *et al.* 1989, Berg and Northcote 1985, Newcomb and Flagg 1983, Bisson and Bilby 1982, Herbert and Merken 1961, Cleary 1956).

Cedarholm and Reid (1987) observed evidence of stress in juvenile coho salmon exposed to suspended sediment levels from 1,000 to 12,000 mg/L. Temporary visual impairment, caused by the suspended sediments, reduced the ability of the salmon to capture prey (Berg 1982). Redding *et al.* (1987) reported physiological changes indicative of stress in coho salmon and steelhead exposed to sublethal levels of suspended sediments. Studies on adult and juvenile salmon have shown that salmon, when exposed to short-term pulses of suspended sediments, dispersed from or avoided the area (Bisson and Bilby 1982, Whitman *et al.* 1982, Berg and Northcote 1985).

The duration and concentration of the turbidity would depend partially on the length of time required to construct the proposed project and the volume and rate that sediment is contributed to the creek, or mobilized, during construction activities. For all projects, MPWMD proposes to isolate the workspace from flowing water, install erosion control devices at the time of the proposed action, and detain sediment laden water on-site. Thus, while turbidity levels may increase over background levels, the increase is likely to be temporary and minor with no detectable effects to steelhead.

b. Sedimentation

Construction operations frequently disturb and expose soil. The major impact to steelhead from disturbing and exposing soil is the production of excess fine sediment. Many construction activities remove vegetation and disrupt the structure of the soil surface, leaving the soil susceptible to rainfall and runoff erosion, channel erosion, and wind erosion. Construction often results in disturbed stream banks and channels. Once vegetation or other bank protection materials are disturbed, flows may begin to erode the unprotected soil. Although stream bank erosion is a fluvial process that may recruit spawning gravels and bedload into stream channels, the rate and size distribution of materials being recruited can be in excess of what the hydraulics of the stream can move to form channel structure. This can create a self-perpetuating cycle of increased recruitment and loss of structure. Consequently, it is necessary to consider the long-term downstream effects of sediment inputs.

Water quality and habitat structure and quality can be adversely affected by excess sedimentation, leading to a series of channel and habitat responses and ultimately affecting steelhead production by increasing their energetic demands and susceptibility to disease and predation. Substantial sedimentation rates could bury less mobile organisms that serve as a food source for many fish species (Ellis 1936, Cordone and Kelley 1961), degrade instream habitat conditions (Cordone and Kelly 1961, Eaglin and Hubert 1993), infiltrate redds resulting in progressively lower egg survival (Tappel and Bjornn 1983, McNeil and Ahnell 1964, Reiser and White 1988, Tagart 1984), and cause reductions in fish abundance (Alexander and Hansen 1986, Berkman and Rabeni 1987) and growth (Crouse *et al.* 1991). Siltation may reduce habitat diversity by filling pool habitat, thereby reducing juvenile rearing habitat and adult holding habitat. Deposited fine sediment can reduce the amount of spawning habitat. Silt may clog spawning gravels, thereby reducing water flow through the gravel and reducing the interstitial dissolved oxygen concentrations. Low dissolved oxygen concentrations may kill eggs and fry. If eggs and fry are not killed, reduced interstitial oxygen concentrations may cause longer incubation periods, higher rates of deformity, and smaller, weaker fry. Siltation may also prevent fry from emerging from the gravel.

Construction projects can cause temporary increases in sedimentation downstream. Projects covered under this opinion will implement avoidance/minimization measures described in the *Project Description* to reduce the input of sediment into the stream. For all projects, MPWMD proposes to isolate the workspace from flowing water, to install erosion control devices at the time of the proposed action, and to detain sediment laden water on-site. Thus, while some sedimentation may result from construction of water diversions and access points, increases are expected to be minimal, temporary, and localized with no long-term degradation of habitat or measurable effects to steelhead.

5. Loss of Riparian Vegetation

Riparian vegetation borders a stream and is an integral part of the habitat for listed steelhead. The functional values of riparian corridors and the benefits they provide to aquatic systems overall, and stream fish populations in particular, are well documented (Hall and Lantz 1969, Karr and Schlosser 1978, Lowrance *et al.* 1985, Wesche *et al.* 1987, Gregory *et al.* 1991, Platts 1991, Welsch 1991, Castelle *et al.* 1994, Lowrance *et al.* 1995, Wang *et al.* 1997).

Loss of riparian habitat may lead to changes in water quality. The removal of shading and increase in solar input may increase water temperatures and/or produce large amounts of algae. As algae dies, biological oxygen demand increases and dissolved oxygen concentrations decrease, reducing water quality. In addition, the loss of riparian vegetation may reduce the amount of energy stored in organic material that serves as food for aquatic invertebrates entering the stream ecosystem, leading to a decrease in aquatic invertebrates. Many of the potentially affected aquatic invertebrates are forage for steelhead. Reduced forage can result in reduced growth rates of steelhead and increased competition for available forage, thus reducing size and fitness and decreasing abundance of steelhead.

Effects on habitat from removal of riparian vegetation can include: wider, shallower, less complex channels; increases in water temperatures; reduction in the amount of energy input from leaf fall; stimulation of algal growth by increasing the amount of light; reduction in the prey base for juvenile steelhead; reduction in habitat diversity by reducing the input of woody debris; and, an increase in sediment and pollutant chemical input into steelhead habitat. All of the above effects may result in reduced steelhead carrying capacity and production.

Typical revegetation efforts would result in post-project health, density, and diversity of vegetation that would likely be greater than pre-project. While it likely will take three to ten years for vegetation to mature and provide significant shade and cover, any benefits provided in the interim are expected to be equal to or greater than what would be present without project implementation. This is because projects are expected to occur in areas with very degraded riparian vegetation conditions, and because current ground and surface water levels are not expected to support natural re-establishment of vegetation.

The magnitude of riparian vegetation loss due to construction will vary depending on the number of projects and the location of project sites. As discussed above, most projects will occur in areas that are highly disturbed from erosion or lack of water. Most mature riparian vegetation that would be removed exists in sparse, unevenly distributed, and discontinuous stands, and has little influence on channel form, function, shade, cover, or bank stability. In accordance with the minimization and avoidance measures described in the *Project Description*, all native vegetation present will be retained to the maximum extent practicable and disturbance will be minimized. Areas of disturbance will be re-vegetated with seed cover and plantings at a minimum 3:1 ratio.

Project proponents will ensure that seedings and plantings have a 70 percent survival rate at the end of three years. As a result, no detectable adverse effects to steelhead are expected to result from loss of riparian vegetation. Rather, project activities are expected to improve riparian habitat conditions over the long term.

6. Harassment and/or Loss of Habitat from Construction Access and Temporary Crossings

Construction access and temporary stream crossings could adversely affect steelhead and/or habitat from: temporary increases in sedimentation, removal of riparian vegetation (both discussed above), constriction of channels resulting in higher velocities, interference to steelhead migration, or obstruction of flood flows causing washouts and reduced spawning and rearing habitat.

For all projects authorized under the RGP, crossings may be in place only between July 1 and October 31 of any year. Access and temporary stream crossing locations will be restored to pre-project conditions, and no crossing will be left in place after October 31. Furthermore, all temporary crossings shall pass all steelhead in the stream concurrent with the crossing. These measures avoid adult steelhead migration and spawning and high flood flows. Rearing juvenile steelhead could be in the vicinity of crossings during this time, but should be able to move out of the way of crossing installation. Once the crossing is installed, fish will be able to move freely about the location. As such, impacts are expected to be localized, temporary, and minor with no detectable effects to steelhead.

7. Loss of LWD and In-Channel Vegetation from Channel Clearing

In-channel vegetation and LWD play an integral part in channel form (*e.g.*, pool-riffle sequences) and function for steelhead. In-channel vegetation is considered to be all vegetation occurring within the active river channel that could cause bank erosion or form debris jams. Some riparian vegetation along the banks that falls below the ordinary high water mark (OHWM) would be considered in-channel and may be trimmed back to prevent bank erosion or debris jams. In-channel vegetation traps sediment deposits and helps to form riffles, pools, and meanders. LWD is commonly produced from riparian areas and is important in many stream ecosystems for stabilizing channel form, storing and metering sediments during sediment routing, and modulating flow hydraulics during various flows, *i.e.*, dissipating kinetic energy. Steelhead production in rearing habitats is increased when an abundance of escape cover (*e.g.*, hiding spots provided by water depth, vegetation, LWD, interstitial spaces in substrate, undercut banks) exists along with forage stations (places of very low water velocity next to threads of higher water velocity in which aquatic invertebrates are entrained). Normally, pool-riffle sequences are integral to this composition. Pools provide depth, cover, and still water, and riffles provide forage and increase oxygenation of water. Pool tails are commonly spawning beds for most steelhead. Adults also require deep pools as holding habitat during their upstream migrations.

Effects on steelhead and habitat from removal of in-channel vegetation and LWD can include: a change to a less complex channel, reduction in the prey base for juvenile steelhead, reduction in habitat diversity by reducing LWD, and reduction in the amount of vegetative matter as a food source for steelhead prey.

The magnitude of in-channel vegetation and LWD loss due to channel clearing activities will vary depending on the number and type of activities and the location of projects completed under each year of the RGP. The RGP limits MPWMD-sponsored work to 2,600 linear ft of stream and private work to less than 1,000 linear ft of stream per year. For all projects, only vegetation and LWD that pose a hazard to public facilities will be disturbed, and only material that threatens bank stability will be removed. Mature vegetation and LWD may be trimmed or mechanically removed for erosion prevention. Only vegetation larger than three inches in diameter will be removed from the channel and removal will be done using hand tools. All vegetation within the channel that is smaller than three inches in diameter will be left in place. Vegetation extending more than 15 ft from the toe of the active channel towards the center of the channel will be trimmed, but left in place. LWD in the active channel that is deemed a hazard by MPWMD will be anchored by appropriate means or cut or notched into lengths of 20-25 ft and left in place to the greatest extent feasible.

The goal of these measures is to maintain as much vegetation and LWD in the channel as possible. By selectively removing only that vegetation and LWD that poses a hazard to public facilities and bank stability, and trimming rather than completely removing vegetation from the banks, activities implemented under the RGP will maintain habitat features and function provided by LWD and riparian vegetation for steelhead. NMFS expects, at most, only minor, temporary and localized effects to critical habitat in the lower Carmel River from this LWD management approach. As such, impacts to steelhead are anticipated to be insignificant.

8. <u>Habitat Degradation from Sand and Gravel Bar Excavation</u>

Sand and gravel bar excavation may adversely affect water quality, habitat structure, and quality and flow regime of the stream ecosystem either temporarily or long-term over a large or small area. Potential adverse effects from these activities include: temporary increases in sedimentation (discussed above), short-term loss of rearing habitat (discussed above), reduction of spawning habitat, loss of resting habitat for migrating adults, and/or reduction of edgewater habitat around sandbars for fry and juvenile rearing habitat.

Sand and gravel bar extraction authorized under this RGP is only allowed as part of channel realignment during channel restoration activities. Sand and gravel bar excavation for channel restoration will occur only in areas where high storm flows have eroded banks or scoured new channels through the floodplain. These conditions occur only after very large storm events that do not occur in most years. Areas where channel realignment is conducted likely would have high levels of disturbance to channel morphology and/or riparian vegetation and would provide marginal habitat for spawning or rearing. Excavation activities can only be conducted between July 1 and October 31 of each year and only in a dry stream channel, and must be restored prior to October 31 of each year. This timing avoids upstream migration and spawning of adults and downstream migration of adults and smolts.

Based on MPWMD geomorphic analysis and past experience, the design criteria for channel realignment, as described in the *Project Description*, is expected to avoid instability and braiding, allow for the development of in-channel bars within two to three years of average winter flows, and allow for rapid development of riparian vegetation. With implementation of these criteria, limitation of channel alignment activities to highly degraded areas, and minimization measures described in the *Project Description*, channel excavation activities are not expected to result in measurable effects to steelhead.

9. Bank Stabilization and Associated Habitat Effects

Bank stabilization completed under this RGP would incorporate biotechnical and bioengineered methods. In some cases, projects could include the use of rip-rap and other approved bank stabilization materials. Rip-rap consists of one or more layers of rock placed along a stream bank and/or dug into the toe of the channel to prevent erosion.

Adverse effects associated with rip-rap include: loss of riparian habitat (discussed above); reduction of coarse sediment into steelhead habitat - under some circumstances, eroding banks may provide spawning gravel; reduction of steelhead rearing habitat by lining irregularly shaped stream banks with fairly uniform quarry rock; suppression of natural channel migration and processes (*e.g.*, erosion and deposition), and prevention of natural successional development of riparian gallery forests; scouring behind stone revetments and erosion from eddies formed at the ends of poorly designed rip-rap placement; an increase in stream velocity by reducing the resistance of the stream bank; an increase in bank erosion downstream on the opposite bank; and disruption of sediment layering and bringing up fine sediments that create a sediment plume from construction of toe trenches in the streambed. These effects reduce the variety and total amount of usable rearing, escape, and resting habitat for salmonids, as well as the productivity of spawning gravel, riffles (where much forage production occurs), and stream edges (for fry).

Approximately 35-40 percent of the stream banks in the Carmel River between RM .5 and RM 15.5 have been structurally altered in some manner. This includes levee construction as well as installation of a variety of bank stabilization/hardening materials. These "hardened" areas can probably resist erosion at higher flows more than a natural bank could. The difference in juvenile density between areas with and without bank hardening has not been evaluated. Confounding factors, such as distance upstream, water quality, and sediment composition, do not allow such comparisons from MPWMD's yearly juvenile samples. Surveys do document juvenile steelhead in restoration sites within a year of project completion, with densities within the same range as found in other upstream and downstream reaches of the survey area (MPWMD, unpublished data). These restoration sites do not include bank stabilization/hardening as conducted in the past (*i.e.*, bare rip-rap, concrete channels), but may use vegetated rip-rap or other materials in a manner proposed under the RGP.

The use of rip-rap as allowed under this RGP is not a continuation of past bank hardening activities that have contributed to the degradation of steelhead habitat. The techniques for bank stabilization and restoration of eroded areas proposed under the RGP are intended to prevent future river bank and bed erosion and degradation of steelhead habitat. These types of activities will be implemented with current technological methods, which NMFS and the MPWMD consider to be improvements and preventative measures which over time will likely improve habitat conditions for steelhead in the lower Carmel River. The RGP limits MPWMD-sponsored work to 2,600 linear ft of stream and private work to less than 1,000 linear ft of stream per year.

Under this RGP, bank stabilization sites will require the use of biotechnical methods, unless infeasible[5] as determined by MPWMD, to minimize the amount of rip-rap installed along the stream banks. Biotechnical methods bring together the best of both structural and vegetative solutions for stabilizing stream banks. For all projects where rip-rap is used, LWD and willow cuttings will be incorporated into the rip-rap, and the rip-rap will be terraced with trees planted on the terraces. Interstitial spaces above ordinary high water will be imbedded with soil and planted with riparian vegetation. MPWMD has used these techniques in the past, and after three to five years, mature riparian vegetation is present along the channel banks, overhanging the channel throughout the rip-rap. Use of vegetation within areas of rip-rap allows mature riparian vegetation to develop, providing cover, shade, and a source of prey for steelhead. These provisions of the RGP avoid a number of the impacts that result from bare rip-rap banks and levees and provide habitat for steelhead rearing and spawning.

Channel maintenance using rip-rap will occur in areas that have been severely eroded by high flows or that have bare banks (*i.e.*, riparian vegetation that has died from drought or water extraction leaving unstable banks). These conditions are not expected to occur every year or in all sections of the project area. Areas where project activities would be conducted are expected to have high levels of disturbance to channel banks with little or no riparian vegetation, thus providing minimal habitat function for steelhead. Because project activities will occur in degraded areas, within a few years of project implementation, habitat conditions for spawning and rearing within the project area are expected to be similar or better than that prior to project implementation (at the very least prevented from degrading further). Without project implementation, poor habitat conditions likely would persist. Nevertheless, restoration using rip-rap rather than "soft" biotechnical methods that allow for more natural channel processes, can in some cases, negatively impact river functions and habitat carrying capacity for steelhead over the long term. However, as stated above, the amount of rip-rap installed along the stream banks will be minimized to the greatest extent feasible and in all cases where rip-rap is installed, vegetation and/or LWD will be incorporated into the structure.

The magnitude of bank stabilization due to channel maintenance or restoration activities will vary depending on the number and type of activities and the location of projects completed under each year of the RGP. From RM 15.5 to RM 18.6, the river is almost exclusively in a narrow canyon under bedrock control. No bank stabilization projects are anticipated in this reach. Bank stabilization could occur anywhere between RM 1.3 to RM 15.5, but generally is anticipated only on the outside of meander bends, where velocities are highest. The distribution and frequency of work completed in previous years will be used as a reasonable estimation of bank stabilization expected under this RGP.

From 1997 to 2002, MPWMD implemented two channel maintenance and restoration projects of the type that would be implemented under the RGP. The first project encompassed 1,800 linear ft of stream channel, which equates to 3,600 linear ft of stream bank when considering banks on both sides of the channel. Within the project area, rip-rap was used along 1,800 linear ft of

[5] On rare occasions, bare rip-rap may be required such as at the base of a bridge abutment. However, NMFS will review each project prior to implementation in order to ensure that minimization measures are incorporated to avoid associated adverse impacts associated with the use of bare rip-rap.

stream bank. The second project encompassed 1,500 linear ft of stream channel and 3,000 linear ft of stream bank. Rip-rap was used along 1,200 linear ft of stream bank. Cumulatively, these projects resulted in 3,000 linear ft of bank stabilization utilizing rip-rap over a period of six years. Between the years of 2004 and 2009, when the RGP was in effect, work that occurred at 28 sites within the action area resulted in a total of 200 cubic yards of rock material being placed for bridge maintenance and bank stabilization. Only 125 linear ft of rip-rap was installed along the stream banks. Most of the work during this time involved vegetation management (26 sites). The length of stream affected by vegetation management during the five year period was approximately 4,885 linear feet. In addition, MPWMD removed hardened material (concrete slab, etc.) from 150 feet of stream. During the five year period, there was no recorded mortality of S-CCC steelhead (no dewatering or fish relocation activities occurred). Therefore, based upon all activities from 1997 to 2009, NMFS expects no more than 3,600 linear ft of bank stabilization utilizing bioengineered or biotechnical methods (cumulative including both banks) will occur annually during the five-year implementation of the RGP. This amount of bank stabilization could result in a temporary loss of habitat, until the areas have time to rebound, and provide better habitat conditions (*e.g.*, more stable channel morphology, shade, decreased sedimentation and erosion, increased instream substrate complexity, etc.) than what previously existed. Although there may be a temporary reduction in the value of critical habitat for a short duration following bank stabilization activities, impacts are expected to be localized, temporary, and minor with no detectable long-term adverse effects to critical habitat and no detectable effects to steelhead.

B. Beneficial Effects to S-CCC Steelhead and Critical Habitat

Fisheries habitat enhancement activities that occur under the RGP, including: placement of log and boulder groups at erosion protection locations to provide additional habitat, replacement of gravel material along the channel bottom to increase spawning and rearing habitat, revegetation of riparian habitat along the banks of the river, modification of critical riffles, and re-establishment of natural pool and riffle sequences to improve rearing and migration conditions are expected to result in long-term beneficial effects to steelhead through increased quality of spawning and rearing habitat. The magnitude and location of benefits will depend on the number, nature, success, and location of projects implemented under the RGP. As such, NMFS is unable to precisely quantify expected benefits. However, the implementation of more current bank stabilization technologies is expected to prevent future degradation of habitat by reducing bank erosion, increase riparian vegetation, and providing for more stable river morphology. These more current methods will also help to ameliorate deleterious impacts from poor bank hardening methods implemented in the past. Therefore, NMFS expects for the fisheries habitat enhancement activities to provide overall benefits for S-CCC steelhead by improving habitat conditions in the lower Carmel River.

NMFS notes that even stable river systems have some eroding banks. Rivers and streams are products of their catchments. As such, they are dynamic systems which mean they are in a constant state of change. Stream bank erosion is a natural process that over time has resulted in the formation of the productive floodplains, high quality instream habitat, and alluvial terraces of many river systems. The factors controlling river and stream formation are complex and interrelated, and include the amount and rate of supply of water and sediment into stream systems, catchment geology, and the type and extent of vegetation in the catchment. As these factors change over time, river systems respond by altering their shape, form and/or location. However, the rate at which erosion is occurring in stable systems is generally much slower and of a smaller scale than that which occurs in unstable systems. In disturbed or altered systems this process can be accelerated, leading to unstable conditions.

VII. CUMULATIVE EFFECTS

A. Effects to Species and Critical Habitat

Cumulative effects include the effects of future State, tribal, local, or private actions that are reasonably certain to occur in the action area considered in this biological opinion. Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the ESA.

Cumulative effects on listed steelhead would occur from future water withdrawals from wells and direct diversions from the Carmel River aquifer and urban, recreational (*i.e.*, golf courses), and agricultural development within the floodplain. Water diversions would affect streamflow and water quality, especially in the low-flow season. Land use activities associated with urban development, road construction, agriculture, and recreation may significantly alter fish habitat quantity and quality through: alteration of stream bank and channel morphology, alteration of stream water temperatures, degradation of water quality, fragmentation of available habitats, elimination of downstream recruitment of LWD, and removal of riparian vegetation resulting in increased stream bank erosion and hardening. These activities are likely commensurate with population growth. Loss of habitat quantity or decreased habitat quality can decrease successful spawning, impair growth and/or survival of early life history stages, and ultimately affect steelhead run size within the watershed. However, the projects that are anticipated to be completed under the RGP are expected to help offset some of these negative effects to steelhead and their critical habitat through the implementation of fish habitat enhancement projects and prevention or minimization of further habitat degradation.

VIII. INTEGRATION AND SYNTHESIS OF EFFECTS

Assessments of steelhead abundance within this DPS show a substantial decline during the past 30 years (CDFG 1965, Nehlsen *et al.* 1991, McEwan and Jackson 1996, Snider 1983). Adult escapement data for the Carmel River above San Clemente Dam show a significant decline of 22 percent per year from 1963 to 1993, with a 5-year total count of only 16 adult steelhead at the dam between 1988-1992. Since 1994, the Carmel River stock partially recovered with a seven-year average (1997-2003) of 636 fish passing the ladder at San Clemente Dam. However, more recent counts (2004-2009) show a downward trend in adult returns, with a 6-year average of 302 fish passing the San Clemente Dam. Although habitat conditions have improved somewhat due to previous restoration and enhancement activities, other factors such as impacts from water diversions, inadequate fish passage into the upper watershed, lagoon management, and changes in ocean conditions are likely contributing to the decline in adult returns. Major factors currently affecting steelhead and their habitat in the Carmel River include construction and operation of the two major dams, changes to the morphology of the river channel, water withdrawals from both surface and groundwater, artificially breaching the lagoon, past hardening of channel banks, and loss of riparian vegetation.

The Carmel River Restoration and Maintenance RGP includes only those projects that avoid or minimize adverse effects and produce beneficial effects to steelhead and their habitat. The long-term goals of the activities authorized under the RGP are to minimize bank erosion and improve habitat conditions for steelhead rearing, spawning, and migration. NMFS anticipates projects implemented under the RGP will result in take of steelhead from capture and relocation of juvenile steelhead during activities requiring flow diversions and dewatering.

Based on past MPWMD channel maintenance and restoration activities and spatial limitations and minimization measures included in the RGP, NMFS expects stream bank stabilization to occur to no more than 3,600 linear ft annually during the five years of the RGP. Stream bank stabilization involving use of bare rip-rap will not occur. Use of cement and other hardening structures is not allowed. Further requirements within the RGP, including use of vegetation and LWD, terracing, and slope/height requirements, will ensure that project areas provide habitat features and function for steelhead even when rip-rap is used. These techniques reduce the impacts resulting from past bank hardening techniques (in some situations, MPWMD has worked with private landowners to remove improper bank stabilizing materials and stabilize the areas with more appropriate materials). Furthermore, use of rip-rap will be limited to areas that have been washed out by high flows or that have bare banks (*e.g.*, riparian vegetation that has died from drought or water extraction leaving unstable banks). Because project activities will occur in degraded areas that offer limited habitat function, and project activities will usually incorporate improvements to those degraded conditions, habitat conditions for spawning and rearing within the project area are expected to be similar or better than that prior to project implementation. Habitat conditions are expected to improve significantly within a few years following construction (assuming average rainfall and runoff conditions). Habitat likely will not recover naturally, without human restoration efforts, due to continuing water extraction that limits riparian growth. Despite expected benefits, bank stabilization using rip-rap or other approved materials (rather than biotechnical methods that allow for a more natural stream bank and shorter rebound time), could result in minor impacts to steelhead through temporary changes to habitat or through longer-term impacts to river morphology that may temporarily reduce the quality of habitat. However, the utilization of the current river restoration and bank stabilization technologies is expected to minimize these adverse effects to critical habitat, thus bank stabilization projects implemented under this RGP are expected to have insignificant impacts on steelhead.

Mortality of S-CCC steelhead due to capture and relocation is dependent upon the number and types of projects carried out annually that would require flow diversions and dewatering. The RGP limits MPWMD maintenance and restoration projects to 2,600 linear ft and privately-sponsored projects to 1,000 linear ft per year. Based on average juvenile densities during summer months and spatial limitations and minimization measures included in the RGP, a maximum[6] of approximately 5,400 juveniles could be captured and relocated, and 162 of those juveniles could be killed due to stranding and handling per year.

Additional habitat impacts are expected from trimming or removal of riparian vegetation, construction of equipment access points, sand and gravel bar excavation, and dewatering of project sites. These effects will be localized, temporary, and minor. Long-term benefits to habitat, including riparian habitat, water quality, and in-channel habitat, likely will compensate for any isolated, short-term adverse effects within each project area. When considered in aggregate, these types of habitat impacts from project actions are not expected to result in identifiable adverse effects to steelhead because of the spatial and temporal limitation included in the RGP. MPWMD and privately-sponsored project areas are limited spatially to no more than 3,600 ft within the 18.6 mile action area per year, and MPWMD projects are expected to occur in response to large flooding events and not in every year of the RGP (based on past MPWMD channel maintenance and restoration activities).

In summary, due to the minimization measures and spatial and temporal limitations included in the RGP, and the current status of the Carmel River steelhead population, the RGP is not expected to result in decline in steelhead abundance, nor permanently impact distribution or reproduction over five years of implementation. Furthermore, implementation of the RGP should increase the value of critical habitat in the action area over five years of implementation. By reducing bank erosion, improving water quality, and implementing restoration activities intended to increase diversity and abundance of vegetation and instream habitat complexity, the projects implemented under this RGP are expected to maintain those PCEs essential to steelhead critical habitat (*e.g.*, spawning gravels, water quality and quantity, open migration corridors, etc.); and thereby promote conservation and recovery of the species by improving the value of the critical habitat (*i.e.*, sites for spawning, rearing, migration, and foraging) necessary to support one or more life stages of the DPS.

IX. CONCLUSION

After reviewing the best scientific and commercial data available, including current status of S-CCC steelhead, the environmental baseline for the action area, the effects of the proposed Carmel River Restoration and Maintenance RGP and the cumulative effects, it is NMFS' biological opinion that the Carmel River Restoration and Maintenance RGP is not likely to jeopardize the continued existence of S-CCC steelhead.

After reviewing the best available scientific and commercial information, the current status of critical habitat, the environmental baseline for the action area, the effects of the proposed action and the cumulative effects, it is NMFS' biological opinion that the Carmel River Restoration and Maintenance RGP is not likely to destroy or adversely modify designated critical habitat for S-CCC steelhead.

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[6] This maximum number would only be achieved if all projects occurred in areas where dewatering and fish relocation was necessary. Given the past five year account of activities, it is probable that this number will not be reached annually since some years' projects will not require dewatering and fish relocation.

X. INCIDENTAL TAKE STATEMENT

Section 9 of the ESA and Federal regulations pursuant to section 4(d) of the ESA prohibit the take of endangered and threatened species, respectively, without special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct. Harm is further defined by NMFS as an act which actually kills or injures fish or wildlife. Such an act may include significant habitat modification or degradation which actually kills or injures fish or wildlife by significantly impairing essential behavioral patterns, including breeding, spawning, rearing, migrating, feeding, or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and 7(o)(2), taking that is incidental to and not intended as part of the proposed action is not considered to be prohibited taking under the ESA provided that such taking is in compliance with this incidental take statement.

The measures described below are nondiscretionary, and must be undertaken by the Corps so that they become binding conditions of any grant or permit issued to the MPWMD for the exemption in section 7(o)(2) to apply. The Corps has a continuing duty to regulate the activity covered by this incidental take statement. If the Corps (1) fails to assume and implement the terms and conditions or (2) fails to require MPWMD to adhere to the terms and conditions of the incidental take statement through enforceable terms that are added to the permit or grant document, the protective coverage of section 7(o)(2) may lapse. In order to monitor the impact of incidental take, the Corps or MPWMD must report the progress of the action and its impact on the species to NMFS as specified in the incidental take statement (50 CFR 402.14(I)(3)).

A. Amount or Extent of Take

Spatial limitation specified in the project description and location and extent of actions completed by MPWMD in the past allow us to identify the maximum take that could occur under the RGP. In general, most incidental take is expected to be in the form of capture for relocation. A small amount of mortalities are expected to result from capture methods as well as from stranding due to construction site dewatering. NMFS anticipates the annual maximum amount of take of S-CCC steelhead from the RGP to be limited to a small portion of the Carmel River steelhead population, including capture and relocation of 5,400 juveniles, and mortality of 162 juveniles. All the incidental take described above is expected to occur to the juvenile life history stage of S-CCC steelhead.

B. Effect of the Take

In the accompanying programmatic biological opinion, NMFS determined that this level of anticipated take is not likely to result in jeopardy to the species.

C. Reasonable and Prudent Measures

NMFS believes the following reasonable and prudent measures are necessary and appropriate to minimize take of S-CCC steelhead:

1. Minimize mortality of juveniles resulting from activities covered in the RGP.
2. Minimize mortality of juveniles resulting from capture and relocation.

D. Terms and Conditions

In order to be exempt from the prohibitions of section 9 of the ESA, the permittee must comply with the following terms and conditions, which implement the reasonable and prudent measures described above and outline required reporting/monitoring requirements. These terms and conditions are non-discretionary.

1. <u>The following terms and conditions implement Reasonable and Prudent Measure 1</u>:

a. MPWMD shall monitor all projects. Monitoring shall include a comprehensive set of photographs documenting compliance with the project description and terms and conditions included in this programmatic biological opinion and the finished projects as built. A monitoring report with photographs shall be provided to NMFS by February 1 of each year.

b. If one or more threatened steelhead is found dead or injured, the project permittee shall contact the NMFS Central Coast Branch Supervisor immediately. The purpose of the contact is to review the activities resulting in take and to determine if additional protective measures are required. All salmonid mortalities shall be retained, placed in an appropriately sized whirl-pak or ziplock bag, labeled with the date and time of collection, fork length, location of capture, and frozen as soon as possible.

Central Coast Branch Supervisor: 707-575-6064

Frozen samples must be delivered to:

Carlos Garza
Fisheries Ecology Division
Southwest Fisheries Science Center
National Marine Fisheries Service
110 Shaffer Rd.
Santa Cruz, CA 95060

c. The Corps and MPWMD shall review the RGP with NMFS after year five of implementation to review the effectiveness of minimization measures included in the project description and the amount of incidental take resulting from individual projects authorized under the RGP.

2. <u>The following terms and conditions implement Reasonable and Prudent Measure 2</u>:

a. MPWMD shall not implement or authorize any channel realignment (considered a type of habitat modification) in areas where bank deformation does not threaten private or public structures.

3. The following terms and conditions implement Reasonable and Prudent Measure 3:

a. Any juvenile steelhead captured during RGP activities shall be relocated to areas of perennial flow within the Carmel River to avoid fish being captured and relocated more than once in a given year.

XI. REINITIATION NOTICE

This concludes formal consultation on the actions outlined in the proposed Carmel River Restoration and Maintenance RGP. As provided in 50 CFR 402.16, reinitiation of formal consultation is required where discretionary Federal involvement or control over the action has been retained (or is authorized by law) and if:: (1) the amount or extent of incidental take is exceeded; (2) new information reveals effects of the action that may affect listed species in a manner or to an extent not previously considered in this opinion; (3) the action is subsequently modified in a manner that causes an effect to the listed species that is not considered in this opinion; or (4) a new species is listed or critical habitat designated that may be affected by the action.

XII. CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the ESA directs Federal agencies to utilize their authorities to further the purposes of the Act by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on a listed species or habitat, to help implement recovery plans, or to develop information.

1. The Corps should work with MPWMD to identify and address the causes of excessive stream bank erosion in the lower Carmel River.

2. The Corps should assess the risk at each bridge associated with debris jams within their jurisdiction in the action area and make recommendations concerning appropriate modifications or retrofits to the bridge piers and/or abutments. Such modifications should include design changes to minimize the risk of debris jams.

In order for the NMFS to be kept informed of actions minimizing or avoiding adverse effects or benefitting listed species or their habitats, NMFS requests notification from the Corps of the implementation of any conservation recommendations.

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70 FR 52488. National Marine Fisheries Service. Final rule: Designation of Critical Habitat for Seven Evolutionarily Significant Units of Pacific Salmon and Steelhead in California. Federal Register 70: 52488-52586. September 2, 2005.

62 FR 43937: National Marine Fisheries Service. Final Rule: Listing of Several Evolutionary Significant Units of West Coast Steelhead. Federal Register, Volume 62 pages 43937-43954. August 18, 1997.

61 FR 56138. National Marine Fisheries Service. Final Rule: Threatened Status for Central California Coho Salmon Evolutionarily Significant Unit (ESU). Federal Register 61:56138-56149. October 31, 1996.

Enclosure

MAGNUSON-STEVENS FISHERY CONSERVATION AND MANAGEMENT ACT ESSENTIAL FISH HABITAT CONSULTATION

For

Carmel River Restoration and Maintenance Regional General Permit

Statutory and Regulatory Information

The Magnuson-Stevens Fishery Conservation and Management Act (MSA), as amended by the Sustainable Fisheries Act of 1996, establishes a national program to manage and conserve the fisheries of the United States through the development of federal Fishery Management Plans (FMPs), and federal regulation of domestic fisheries under those FMPs, within the 200-mile U.S. Exclusive Economic Zone ("EEZ")(16 U.S.C. §1801 *et seq.*). To ensure habitat considerations receive increased attention for the conservation and management of fishery resources, the amended MSA required each existing, and any new, FMP to "describe and identify essential fish habitat for the fishery based on the guidelines established by the Secretary under section 1855(b)(1)(A) of this title, minimize to the extent practicable adverse effects on such habitat caused by fishing, and identify other actions to encourage the conservation and enhancement of such habitat." 16 U.S.C. §1853(a)(7). Essential Fish Habitat (EFH) is defined in the MSA as "those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity" 16 U.S.C. §1802(10). The components of this definition are interpreted at 50 C.F.R. §600.10 as follows: "Waters" include aquatic areas and their associated physical, chemical, and biological properties that are used by fish and may include aquatic areas historically used by fish where appropriate; "substrate" includes sediment, hard bottom, structures underlying the waters, and associated biological communities; "necessary" means the habitat required to support a sustainable fishery and the managed species' contribution to a healthy ecosystem; and "spawning, breeding, feeding, or growth to maturity" covers a species' full life cycle.

Pursuant to the MSA, each federal agency is mandated to consult with NMFS (as delegated by the Secretary of Commerce) with respect to any action authorized, funded, or undertaken, or proposed to be, by such agency that may adversely affect any EFH under this Act. 16 U.S.C. §1855(b)(2). The MSA further mandates that where NMFS receives information from a Fishery Management Council or federal or state agency or determines from other sources that an action authorized, funded, or undertaken, or proposed to be, by any federal or state agency would adversely effect any EFH identified under this Act, NMFS has an obligation to recommend to such agency measures that can be taken by such agency to conserve EFH. 16 U.S.C. §1855(4)(A). The term "adverse effect" is interpreted at 50 C.F.R. §600.810(a) as any impact that reduces quality and/or quantity of EFH and may include direct or indirect physical, chemical, or biological alterations of the waters or substrate and loss of, or injury to, benthic organisms, prey species and their habitat, and other ecosystem components, if such modifications reduce quantity and/or quality of EFH. In addition, adverse effects to EFH may result from actions occurring within EFH or outside EFH and may include site-specific or habitat-wide impacts, including individual, cumulative, or synergistic consequences of actions.

If NMFS determines that an action would adversely affect EFH and subsequently recommends measures to conserve such habitat, the MSA proscribes that the Federal action agency that receives the conservation recommendation must provide a detailed response in writing to NMFS within 30 days after receiving EFH conservation recommendations. The response must include a description of measures proposed by the agency for avoiding, mitigating, or offsetting the impact of the activity on EFH. In the case of a response that is inconsistent with NMFS EFH conservation recommendations, the Federal agency must explain its reasons for not following the recommendations. 16 U.S.C. §1855(b)(4)(B).

Background and Consultation History

For purposes of this consultation, the proposed action is Corps renewal of a Regional General Permit (RGP 24460S) pursuant to section 404 of the Clean Water Act for Monterey Peninsula Water Management District (MPWMD) to conduct river maintenance, restoration, and habitat enhancement activities and authorize similar privately-sponsored activities within a 18.6-mile segment of the Carmel River in Monterey County, California.

The original RGP was issued by the Corps in November 2004 and was valid until November 2009. On February 19, 2010, the MPWMD submitted an application to the Corps to renew the RGP for another five years. By letter dated May 26, 2010, received by NMFS on June 1, 2010, the Corps initiated section 7 formal consultation and EFH consultation for a renewed RGP.

Proposed Action

The RGP would be effective for 5 years with work conducted between July 1 and October 31 of each year. The proposed project would restore bank stability and channel meanders in unstable areas and reestablish or enhance riparian resources in areas impacted by large storm events and/or low water conditions.

Project details and a list of conservation measures are described in the enclosed biological opinion. Of the activities described, only vegetation management activities will occur within designated EFH. Activities include removal of woody plant material that represents an erosion threat to strambanks and public infrastructure, and removal of trash and inorganic debris from the river channel. These activities would follow MPWMD's Final Guidelines for Vegetation Management and Removal of Deleterious Materials for the Carmel River Riparian Corridor, March 2003. Where needed, vegetation removal in the active channel will be kept to the minimum necessary to reduce obstruction of river flows and the potential for bank erosion. Vegetation cutting will be done by hand crews using hand tools and hand-held power tools, and cleared material will be chipped on the terraces above the riverbank or utilized in bank stabilization projects elsewhere along the river. All other maintenance, restoration, and enhance activities authorized under the RGP would occur upstream of the estuarine EFH in freshwater portions of the Carmel River that are not designated EFH.

The conservation measures described in the biological opinion and in the consultation initiation package as parts of the proposed action are intended to reduce or avoid adverse effects to EFH.

The NMFS regards these conservation measures as integral components of the proposed action and expects that all proposed activities will be completed consistent with those measures. We have completed our effects analysis accordingly. Any deviation from these conservation measures will be beyond the scope of this consultation and may require supplemental consultation to determine what effect the modified action is likely to have on EFH.

Action Area

For purposes of this consultation, the action area is an 18.6-mile segment of the Carmel River in Monterey County, California (Pacific Ocean to Sleepy Hollow). The project location extends from RM 0 at the Carmel River lagoon to RM 18.6 at the San Clemente Dam.

The Carmel River lagoon extends from the Pacific Ocean to approximately RM 1 within the proposed action area and is designated EFH for various federally managed fish species within the Fishery Management Plans (FMPs). In addition, the Carmel River Lagoon is also designated as coastal estuary Habitat Area of Particular Concern (HAPC) for various federally managed fish species within the Pacific Groundfish FMP. HAPC are described in the regulations as subsets of EFH that are rare, particularly susceptible to human-induced degradation, especially ecologically important, or located in an environmentally stressed area. Designated HAPC are not afforded any additional regulatory protection under MSA; however, federal projects with potential adverse impacts to HAPC will be more carefully scrutinized during the consultation process.

Effects of the Action

NMFS has evaluated the proposed project for potential adverse effects to EFH pursuant to Section 305(b)(2) of the MSA. Potential adverse effects to EFH from proposed maintenance, restoration, and enhancement activities include temporary increases in turbidity within Carmel River Lagoon EFH. Elevated turbidity within the lagoon could result both from hand removal of vegetation within the lagoon or activities that occur upstream along the Carmel River. The duration and concentration of the turbidity would depend partially on the length of time over which activities occur and the volume and rate that sediment is contributed to the creek, or mobilized, during activities. Based on the project description, MPWMD does not anticipate much work within the lagoon, and work that does happen would likely occur over a short time period (a few days) and within a relatively small footprint. For all projects, MPWMD proposes to isolate the workspace from flowing water, install erosion control devices at the time of the proposed action, and detain sediment laden water on-site. Furthermore, elevated turbidity levels that do travel downstream likely will dissipate before reaching the lagoon. Thus, while turbidity levels within the lagoon may increase over background levels, the increase is likely to be temporary and minor.

Based on information provided in the EFH assessment and developed during consultation, NMFS concludes that proposed action would adversely affect EFH for various federally managed species within the Coastal Pelagic and Pacific Groundfish FMPs. However, the proposed action contains adequate measures to avoid, minimize, mitigate, or otherwise offset the adverse effects to EFH. Therefore, NMFS has no additional EFH Conservation Recommendations to provide. This concludes EFH consultation for the Corps' RGP issued for

MPWMD maintenance, restoration, and enhancement activities on the Carmel River in Monterey County, California.

Supplemental Consultation

Pursuant to 50 CFR 600.920(l), the Corps must reinitiate EFH consultation with NMFS if the proposed action is substantially revised in a way that may adversely affect EFH, or if new information becomes available that affects the basis for NMFS' EFH Conservation Recommendations.